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REPORT ON THE AGRICULTURAL ACTIVITIES OF GOVERNMENT IN BIHAR AND ORISSA FOR THE YEAR 1916-17.

Annual Report of the College of Agriculture, Sabour.

No. 1563, dated Sabour, the 14th July 1917.

From—C. SOMERS TAYLOR, Esq., B.A., Principal of the College of Agriculture, Sabour, near Bhagalpur,

To—The Director of Agriculture, Bihar and Orissa.

I have the honour to submit herewith the Annual Report of the Sabour Agricultural College for the year ending 30th June 1917.

1. *Charge and Tours.*—I held charge of the duties of the Principal of the College throughout the year except for a period of 41 days when I was on privilege leave prefixed to the Dasahara holidays. During my absence Mr. S. N. Sil, Assistant Professor of Agriculture, performed the duties of the Principal. I was also absent from headquarters during the College vacation *from 25th April 1917 to 25th May 1917 on military duty* at Pachmahri, when Mr. N. S. McGowan, Professor of Agriculture, held charge of the current duties in addition to his own. I was on tour for 37 days during the year.

2. *Staff.*—The Reference Clerk, Babu Fanindra Nath Chattarji, has been appointed temporarily as an Assistant in the Financial Department of Government in November 1916, for a period of one year and Babu Sasi Bhusan Ghosh, clerk in the office of the Agricultural Chemist to Government, has been acting in his place. There has been no other change in the staff under the Principal.

3. *Education.*—The three years' diploma course, which will come to an end in March 1918, is running alongside the two years' course, which started in June 1916. The main feature of the two years course is that it attempts to give a practical training in agriculture with science teaching of a much more elementary type than was given in the old Diploma course. The course in practical agriculture covers, to all intents and purposes, the same ground as did the old Diploma course. The scientific training, however, is only sufficient to enable the student to grasp the main facts in scientific agriculture. It might be expected that a different class of men would be attracted by each course and that the two years' practical course would appeal far more strongly to the real cultivator than the three years' course with its more advanced scientific subjects. The majority of the students, however, who come here still have to start their training from the very beginning, most of them being ignorant of the elements of the cultivator's art.

An extensive tour was arranged in order to broaden the outlook of the Diploma students. In the course of this tour they visited the farms at Cuttack and Ranchi and they were also permitted to see the large sugar factory at Ryam in the district of Darbhanga by the kindness of Mr. C. F. Armstrong, the Manager.

An arrangement has been made with the Registrar, Co-operative Credit Societies, Bihar and Orissa, to give a few lectures in co-operation to the students before leaving the College.

In February last a meeting was held at Calcutta regarding the reorganization of the Agricultural College at Sabour which was attended by the Directors of Agriculture, Bengal, Assam, Bihar and Orissa and myself.

4. *Examination.*—The diploma and annual examinations of the College were held from 22nd to 29th March 1917. The diploma examination was conducted by the College staff with the assistance of the following external examiners:—

1. Mr. W. Roberts, Professor of Agriculture, Agricultural College, Lyallpur.
2. Mr. J. H. Barnes, Imperial Agricultural Chemist, Pusa.
3. Mr. D. Milne, Economic Botanist, Agricultural College, Lyallpur.

Mr. D. Quinlan, Superintendent, Civil Veterinary Department, also examined the class in Veterinary Science.

Of the 4 students who sat for the examination only one obtained the diploma. This result although extremely disappointing was not entirely unexpected, as the standard of this class was very low. Of the 3 who failed in the examination one was allowed to rejoin the 3rd year class at the recommendation of the Director of Land Records and Agriculture, Assam.

In the 2nd year class there were 9 students in the beginning of the session. One student who was in the 1st year class in the previous year and joined the Bengal Ambulance Corps, was, on the disbandment of the corps, permitted to join this class. All the 10 students took the annual examination. Of these 2 failed and were not permitted to rejoin. The rest were promoted to the 3rd year class.

At the beginning of the period under review there were 22 students in the 1st year class. Of these 3 left but one student who was in the 1st year class in the previous year and who had joined the Bengal Ambulance Corps was readmitted into this class. There were, therefore, at the end of the year 20 students in the 1st year class. Of these 19 sat for the annual examination, but only 11 of the 19 showed sufficient progress to allow of their promotion to the 2nd year class. The student who did not sit for the examination was prevented from doing so by illness alone, and in view of his good previous work he was promoted to the 2nd year class. There are, therefore, in the 2nd year class only 12 students out of 24 who originally joined the 1st year class. Of the failures one was readmitted into the 1st year class and one has been allowed to attend the 2nd year class lectures as a casual student on the understanding that he will not be allowed to sit for the certificate examination.

No prize was awarded this year as none of the students deserved it.

5. *Admission.*—Both from the reports of Sectional Officers and as a result of observations on the annual examination I have come to the conclusion that the majority of failures here have largely been due to an insufficient knowledge of English and consequent inability both to write notes and read text-books. With a view towards eliminating from the beginning such as were not intellectually capable of taking the College course a test examination in English, Arithmetic and Elementary Algebra was held by me in June last before the 1st year class in the session 1917-18 was opened. In all 20 students sat for this examination of whom 3 were candidates for scholarships sanctioned by the Government of Bihar and Orissa for students from this Province. Of these 20, 18 qualified but only 11 actually appeared for admission. Two students who were in the 1st year class in the previous session and were not promoted to the 2nd year class were also readmitted. There are, therefore, 13 students now on the rolls in the 1st year. As far as can be observed at present, the test examination has kept away students who would not be capable of passing at the end of one year's training, and should, therefore, prevent a considerable amount of disappointment, although the numbers at the beginning of this year are not so imposing as they were last.

The total number of students on the roll at the beginning of the session 1917-18 was:—

1st year class	...	13
2nd " "	...	12 Regular. 1 Casual.
3rd " "	...	9

The statement below shows the distribution of the students by provinces:—

Bengal	17
Bihar and Orissa	7
Assam	11
Total	35

6. *Short Course.*—As there was only one applicant foradmission into the *Bhadai* Short Course class in June 1916, the class was not held. Two students were admitted into the *Rabi* Short Course class which opened in October 1916 and ended in March 1917. In the *Bhadai* Short Course class which opened in June 1917, 2 students have been admitted.

7. *Scholarships.*—The Harimohan Prammohan scholarship continued to be held by Braja Gopal Das who has since left the College on obtaining the diploma. The scholarship is now vacant as the work of the present students during the past year does not justify any recommendation. The Maling Grant scholarship intended for a student from the St. Andrew's Colonial Homes, Kalimpong, remained vacant, as no student joined the College from that school. Of the 6 scholarship-holders from Assam in the year under report one left the College after the last diploma examination and two new scholars joined in June last. There are now 7 scholarship-holders from Assam as named below:—

1. Kamini Kumar De.
2. Mohi Chandra Gogoi.
3. Lovel Lewis Reade.
4. Mohsin Ali.
5. Profulla Chandra Dutt.
6. Pulin Behari Ghosh.
7. Karim Bux.

During the period under review one of the 3 students who were awarded scholarships last year under Bihar and Orissa Government order No. 7882-R-1A-107, dated 25th November 1915, left the College after a short stay and another was deprived of the scholarship as he did badly in the annual Examination held in March last. On the reopening of the College session in June 1917 the following 3 students from this Province were recommended for scholarships:—

1. Babu Basanta Charan Sarangi (Oriya).
2. „ Bhubaneswar Singh (Biharee).
3. „ Ram Kirat Lal (Biharee).

Nos. 1 and 2 found the practical work here to be of too strenuous a nature, while No. 3 left first of all to consult his people, and was sent back here by their advice. Babu Jadunandan Proshad, an unsuccessful candidate, decided to come here as a paying student and has since been awarded a scholarship. The question of making further recommendations for vacant scholarships has been kept in abeyance for the present, as the original men recommended played fast and loose to such an extent that it will be necessary to be more certain in future before making the recommendations. It is difficult to conceive the state of mind of a man who appears for a scholarship, and enters the College, before he has obtained a clear idea of what the College work is likely to be. This has, however, been the case with several of the candidates here. It is perhaps as well that we should not be burdened with men who have insufficient intelligence to grasp the fact that manual labour on their part will be necessary if they are to learn farming. It is, however, disheartening and has, in some cases, prevented more deserving candidates from entering the College, when such men have turned up, taken the scholarship and discovered that their constitutions were too delicate to carry out ordinary farming operations.

The special scholarship of Rs. 20 a month sanctioned by the Government of Bihar and Orissa in their Order No. 477-R-IA-16, dated 1st February 1916, continued to be held by Banchhanidhi Routray.

Two scholarships of Rs. 25 each a month offered by the Trustees of the Sir Andrew Fraser Memorial Fund, Patna City, were held by Ambica Dutt Jha and Muhammad Mahmud. The latter scholar failed to satisfy the examiners in the annual examination held in March last and left the College. One of the scholarships is therefore vacant.

The Mymensing District Board Scholarship continued to be held by Himadri Kumar Chandra Gupta while the Malda District Board scholarship was held by Braja Gopal Das who has since left the College on obtaining the diploma.

The Devi Prosad Scholarship of Rs. 4 per mensem tenable for two years, founded by Babu Radha Mohan Das, Extra Assistant Commissioner, Dibrugarh, was awarded by the Director of Land Records and Agriculture, Assam, to Ishan Chandra Deb of Sylhet, a student in the 1st year class.

The abovenamed gentleman also offered a prize of Rs. 33 to be awarded, as a silver medal, to the student of the Sylhet district who attained the highest number of aggregate marks in the final examination of this College. As no Sylhet student has yet passed that examination the medal has not yet been awarded.

8. *Hostel.*—Babu M. N. Ghosh was in charge of the Hostel throughout the year. His work has as usual been thoroughly satisfactory.

The discipline of the students continued to be good, except that in the year under report there seemed to be an increasing tendency among some of the students to overstay the leave granted to them. Such students were disallowed any refund of the Hostel charges paid by them for the period of their absence, but this did not prove to be sufficiently deterrent, and I have been compelled to make a by-law that any student overstaying the leave granted to him without obtaining previous permission is to be fined 8 annas per day for the period overstayed. In all other respects the conduct of the students was very satisfactory.

At the request of the Registrar, Co-operative Credit Societies, who had arranged a course of training for the Managers and employees of the Co-operative Banks, 12 persons were accommodated in the Hostel for 28 days.

The receipts from students show a further improvement this year over the last year's figures. Rs. 1,729 was collected as tuition fees as against 1,187 collected last year.

As the number of the students in the year under report was greater than any in the preceding years, the amount collected for rent and attendance was also fairly satisfactory, and not only covered the expenses for the temporary staff but also left a fair margin for rent.

The expenditure on the Hostel establishment is shown below :—

	Rs.	a.	p.
Temporary Staff (cooks and servants)	588	0	0
Permanent Staff (darwan, chaukidar and peon) ...	211	0	0
Steward	300	0	0

The expenditure upon the students' diet just balanced the income, partly due to the general rise of prices on account of the war and partly due to the heavy flood of the Ganges last year which swept away nearly all the vegetable-growing fields in the neighbourhood. The price of fuel and all food materials except rice ran high. In spite of this, however, we were practically able to keep within our means. The expenditure under the head "Dietary charges" was Rs. 2,713 and the amount realized from the students was Rs. 2,711. In addition there was a further expenditure of Rs. 164 on account of furniture and utensils and Rs. 54 on account of miscellaneous expenses.

9. *Recreations.*—As the number of students increased it was expected that a healthy interest would be revived in the games and the College would once again form a strong team. The type of students, however, who joined during last year appeared to differ from that in previous years. There was a singular lack of that sporting interest which had been noticeable during previous years and which enabled the College to hold its own in spite of its limited numbers. It is as yet rather early to speak of those admitted this year. In football the students lost all the matches except two and in hockey they lost the Mollison Cup, which we held for two years, to the Tej Narain Jubilee College.

The balance sheet of the athletic club is given below :—

Receipts.

	Rs.	a.	p.
By balance	109	13	7
Subscriptions from students	290	4	0
From staff	52	0	0
Government aid	277	4	0
Interest	3	8	0
Total ...	732	13	7

Expenditure.

	Rs.	a.	p.
Cost of apparatus	447	3	0
Pay of servant	72	8	0
Expenses for playing matches	115	1	0
Balance in hand	98	1	7
Total ...	732	13	7

10. *Hostel Library.*—The records of the Hostel Library in the year under review are more satisfactory than in the previous year. The average number of books issued per student was 11·8. Subscriptions continued to the *Statesman* and the *Prabasi*, and the *Boy's Own Paper* has been added to the list of periodicals for this year. Twenty-six new books were purchased of which 21 were vernacular and 5 English. The balance sheet is given below :—

Receipts.

	Rs.	a.	p.
Opening balance	15	2	7
Subscription	94	14	0
Interest	6	4	11
Total ...	110	7	6

Expenditure.

	Rs.	a.	p.
Subscription for newspapers and cost of new books ...	68	14	0
Miscellaneous	5	0	0
By balance	36	9	6
Total ...	110	7	6

11. *Employment of Students.*—The only student who obtained the Diploma in the year under report has been appointed temporarily as a Supernumerary Agriculturist and has been posted to Ranchi Farm for further training.

12. *Pubtic Works Department Construction.*—Only a few minor works were carried out during the year. They were as follows: —

	Rs.
1. Providing doors, etc., to the Hostel courts	167
2. A pucca drain near the "B" Type quarters	231
3. Providing fixed iron gratings to doors and windows in the Indian Professors' quarters, No. II	203

As regards major works, a fire engine and a hose for the College was provided at a cost of Rs. 688. An allotment of Rs. 19,500 was also sanctioned for a subsidiary water-supply and irrigation scheme and other minor works of improvement at the Agricultural College. The administrative approval for this scheme was accorded in Government order No. 7774-R-IIIB-203, dated 16th October 1914.

13. *Estate Work.*—The work on the College grounds was under the control of Mr. S. K. Basu who is in charge of the Economic Botanist's office, to whom I am much obliged for his assistance. Only routine work was carried out as the majority of laying out of the grounds had previously been done.

This chiefly consisted in—

1. Keeping the grounds and roads clear of weeds.
2. In planting a few more plants which were not previously available.
3. In replacing some plants which were killed.
4. In mowing and rolling the football and the hockey grounds.
5. In a minor degree filling up hollows and ditches.

14. *Medical and Conservancy.*—Sub-Assistant Surgeon Saiyid Moinuddin, who was in charge of the Dispensary and Conservancy work during the previous year, was transferred to military duty in November 1916. His place was temporarily taken by Sub-Assistant Surgeon Mr. Konati Daleppa who was subsequently transferred in March last. Sub-Assistant Surgeon M. Warasat Husain then took over charge, but went on leave after a short stay and Sub-Assistant Surgeon Babu Girija Bhushan Banarji joined on 14th April 1917 and is at present in charge of Medical and Conservancy work. During the year under report 7,411 cases were treated in the Dispensary as compared with 5,469 in the previous year. The daily average attendance was 49 against 39 in the preceding year. The Sub-Assistant Surgeon estimates that about 85 per cent of the total number of out-patients were not connected with the College. This increase was due to the free dispensing of medicines to the outside public for which the District Board, Bhagalpur, grants a subsidy of Rs. 250 per annum. The present staff of the Dispensary consists of—

One Sub-Assistant Surgeon.

One Compounder.

Two peons.

As it appeared that the number of workers in the Dispensary was inadequate to meet the growing demand for assistance and as this increase of work was due to the coming in of men from outside the estate, I have requested the District Board of Bhagalpur to consider the advisability of increasing the subsidy so that a Dresser might be appointed to cope with the enormous increase of work. Correspondence is still going on in the matter.

The health of the students was good throughout the year showing an average of ·67 absentees per day through sickness and injury. No infectious disease occurred amongst the students or the staff. There was, however, one case of small-pox among the sweepers living on the estate. The patient was at

once removed on discovery and the quarters were disinfected. On the advice of the Civil Surgeon the students were all vaccinated as the case occurred close to the hostel.

The following statement shows the expenditure incurred on account of pay and allowance of the Medical establishment and allowance paid to the Civil Surgeon during the year :—

—	Pay.	Allowance.	Total.
1	2	3	4
	Rs. a. p.	Rs. a. p.	Rs. a. p.
Sub-Assistant Surgeon	534 5 0	162 8 0	696 13 0
Compounder	186 8 0	...	186 8 0
Two peons	192 0 0	...	192 0 0
Civil Surgeon	...	300 0 0	300 0 0
Total ...	...	...	1,375 5 0

The expenditure on Medical stores amounted to Rs. 606.

15. *Library.*—The Library is now in an efficient condition. Two separate check lists of books and periodicals have been prepared and the card index record is in order. Several missing and back numbers of books and periodicals have been obtained and I am attempting to procure the remaining ones. During the year 103 books and 20 District Maps were added to the library by purchase and 7 books, etc., were sent by the Director of Agriculture, Bihar and Orissa. Four books were also received from the authors. A large number of Agricultural publications continued to be received from different countries in exchange for the Departmental Journal. In some cases also back numbers have been received. During the period under review Rs. 2,676 was spent upon the purchase of books and periodicals out of the contingent allotment. An additional expenditure of Rs. 728-1-0 was met from the Provincial Association Funds at the disposal of the Director of Agriculture, Bihar and Orissa, for obtaining back numbers of periodicals. Rs. 280-8-0 was spent from office contingencies for binding several volumes of journals.

16. *Office.*—The work of the office has continued to be thoroughly satisfactory. I wish, however, particularly to express my satisfaction with the work of the Head Clerk, Babu Surendra Nath Bhattacharji, who has, as usual, been of great assistance and the Accountant, M. Golam Hossain, has worked zealously and well.

The amount spent in contingencies under each of the detailed heads is given below :—

	Rs.
1. Medical Stores	606
2. Books and Periodicals	2,676
3. Cost of European Stores and freight	873
4. Purchase and repair of furniture	5
5. Hot weather charges	105
6. Service Postage and Telegrams	289

	Rs.
7. Miscellaneous	944
8. Honorarium to Examiners...	450
9. Conservancy—Miscellaneous	43
10. Aid to Athletic Club	277
11. Upkeep of College Grounds	2,050
12. Conservancy Establishment	628
13. Students' tour	152
14. Honorarium and Carriage hire to Veterinary Assistant ...	410

Hostel.

1. Dietary charges	2,712
2. Furniture and utensils	164
3. Pay of menials	588
4. Miscellaneous	54

During the period under review 2,459 letters were received and 2,461 issued as compared with 2,560 and 2,360, respectively, in the previous year.

The accounts of the office were audited during the year by the Accountant of the office of the Director of Agriculture, Bihar and Orissa.

17. *Publications.*—During the year under report Volume IV (Double Number) of the Departmental Half-Yearly Journal was published and Volume V, No. I, of the Journal was sent to Press. The publication of this journal has been temporarily suspended during the period of the present war and the question of its resumption will be taken up six months after the conclusion of the war.

A statement showing the distribution of the Journal is given below :—

Subscribers	180
Free List (Indian)	192
Ditto (Foreign)	14
Exchange (Foreign)	58
Ditto (Indian)	6

18. *Visitors.*—The Honourable Sir Claude Hill, Revenue Member, Government of India, visited the College on December 28th, 1916, and the Director of Agriculture, Bihar and Orissa, inspected the College twice during the year, Mr. K. S. Caldwell, Professor of Chemistry, Patna College, also paid a short visit to the College.

No. 317, dated Sabour, the 14th—17th July 1917.

From—C SOMERS TAYLOR, Esq., B.A., Agricultural Chemist to the Government of Bihar and Orissa,

To—The Director of Agriculture, Bihar and Orissa.

I have the honour to submit herewith my annual report for the year ending 30th June 1917.

1. *Charge.*—I was in charge of the chemical section throughout the year, except in September when I was on privilege leave and for a part of April and May when I attended the musketry course at Pachmarhi. On both of these occasions Babu Manmatha Nath Ghosh held charge of the office.

2. *Staff.*—Babu Suresh Chandra Chakravartty was appointed as Assistant on training on 2nd June 1917 and Babu Shashi Bhusan Ghosh, the clerk, was transferred to Principal's office on 27th November 1916. The photographer, Babu Anil Chandra Mitra, joined the Bengali Regiment in June 1917. Babu Ganesh Chandra Mitra, the temporary clerk, resigned.

3. *Teaching.*—The new syllabus was taken up for the first time during 1916-17.

4. *Sugarcane.*—Some work has been done on the new colour test for aconitic acid which I discovered last year, but I have not succeeded in determining the nature of the coloured substance. Some work has been done on the fibre of the sugarcanes grown in the Botanic garden and the Sepaya canes were analysed.

5. *Permanent Experiment plots.*—The crops from these plots are being regularly analysed. Very striking results are beginning to be observed indicating marked advantages due to certain rotations.

6. *Jowar.*—As indicated in last year's report experiments were taken up with a view to finding out the quantity of Hydrocyanic acid developed in *Jowar* when the crops are planted at different times and also if they are water-logged. On account of unusually heavy rains all the plots were water-logged and the plants did not grow well. Notwithstanding this, they all gave very small quantities of poison even at a very young stage. The experiment is being carried on this year and plots have been laid out and crops planted at different times. One series has been planted well in advance of the usual time of sowing in the hope that we might find the effect of adverse conditions on the development of the poison. Unfortunately, however, the weather conditions were unsettled but the observations are still being carried on and will be continued for some time.

6. *Milk.*—Quite a large number of milk analyses were made in connexion with the feeding experiments with rice meal done by the Professor of Agriculture. I was unable to give a definite opinion on the results as the number of milch cattle available for experiment was too small to warrant the drawing of general conclusions.

7. *Soils.*—A large number of soils and sub-soils were received from all parts of the Province and were analysed.

8. *Apatite.*—Laboratory experiments have been made with this mineral to determine the increase in the so-called 'available' phosphoric acid of the soil when it has been applied in ordinary agricultural quantities. It was found with the Ranchi soil when mixed with finely ground apatite at the rate of a ton to the acre that the amount of 'available' phosphoric acid was very greatly increased. The apatite used was not properly ground being only of 40 per cent fineness. Had it been the regulation 80 per cent fineness it might have given still better results. It is, therefore, possible that pure apatite applied in large quantities to soils poor in phosphate may give increased yields. There is no doubt, however, that its insolubility is a great drawback and I have carried out experiments in my laboratory with a view to finding some cheap way of rendering the phosphoric acid soluble, other than by the use of acids and alkalies which are at prohibitive

prices at present. Experiments on the same subject have also been carried out at Sakchi at my suggestion by the kindness of Mr. Arnold, Chief Chemist at Messrs. Tata's Works, with the permission of Mr. Tutwiler, the Manager. I regret to say that up to the present no practicable way of treating the apatite has been discovered.

9. *Sargooja Ash.*—Owing to the present exhorbitant price of potash it was thought that it might be possible to make use of the ash of *sargooja* stalks which are not eaten by cattle. *Sargooja* is grown in large quantities in Chota Nagpur and a sample of the ash of the stalks was sent to me by Mr. Dobbs for analysis and found to contain 20 per cent potash. Mr. Dobbs has been informed of this and is in correspondence with me on the matter.

10. *Soil Survey.*—I have at present in hand a scheme in connection with a systematic soil survey of the south of Bhagalpur district, principally from the point of view of its phosphoric content and samples from various places are being collected by the Assistant Agricultural Chemist. The work has been suspended for the present and will be taken up later after the rainy season when travelling into the interior of the district will be less difficult.

11. *Miscellaneous.*—The Assistant Professor of Chemistry was at work on the bitter principles of bitter *Kaddus*. The bitterness of these *Kaddus* appeared to be due to a glucoside which hydrolized so easily that it was difficult to isolate. This work could not be continued owing to pressure of other work. The usual routine work was done upon manures, feeding stuffs and general agricultural produce.

12. *Tours.*—I was on tour for 37 days during the year under report. The most interesting tours were to Sakchi for the investigation of basic slag in Tata's Iron Works and to Narhar to select sites for the new sugarcane station; reports have already been submitted on these subjects.

13. *Merits of Subordinate Officers.*—I have to acknowledge the zealous assistance during the year of Babu Manmatha Nath Ghosh, the Assistant Professor of Chemistry, and of Mr. G. Srinivasan, the Assistant to the Agricultural Chemist. The former has shown great keenness in research work as well as upon his routine duties, while the latter has carried out a great amount of routine analytical work with accuracy and despatch. Babu Shashanka Bhushan Roy, the Demonstrator in Chemistry, is hardworking and conscientious and is a reliable assistant, who is obviously keen on his work.

Annual Report of work done in the Entomological Section during the year ending 30th June 1917.

I.—Administration.

Charge.—During the year under report, I continued to remain in charge of the section in the absence of the permanent Economic Botanist.

Staff.—The post of Demonstrator in Entomology was held by Babu Dhirendra Nath Pal, who worked satisfactorily. Babu Jnanendra Nath Mukharji was, on the completion of his probationary period, confirmed in the post of Fieldman in Entomology on the 1st April 1916. Babu Biseswar Sahai continued in the post of Entomological Setter.

Leave.—Combined leave of eight months was enjoyed by Babu Dhirendra Nath Pal from the 15th August 1916 to the 13th April 1917, there being no *locum tenens* during his absence. One month's privilege leave was granted to Babu Jnanendra Nath Mukharji from the 3rd May 1917 to the 2nd June 1917, and Babu Biseswar Sahai was on one and-a-half months' privilege leave with effect from the 5th June 1917.

II.—Scientific and Research.

A complete study of the life history and seasonal history of a Braconid parasite of Agrotis ypsilon was made in the Insectary, with a view to finding out if it was possible to utilize this parasite in controlling Agrotis caterpillars affecting *Rabi* crops in the *chaur* lands of this Province. Preliminary arrangements were made for the introduction of this parasite, in an affected area near Colgong, early in the ensuing *Rabi* season. In order to study the effect of the destruction of its common food plant, on the occurrence and the multiplication of Agrotis caterpillars in the *chaur* lands, another area in the same locality was completely freed from the weed "Agra" (*Xanthium strumarium*) at a cost of Rs. 132-12-6. This weed is one of the commonest food plants of the early broods of the insect in the locality.

Further work was done on the life history of Agrotis ypsilon in the Insectary and it was observed that continued inbreeding resulted in their sterility. The question of its aestivation in the plains was gone into and an officer was specially deputed for studying the pest under field conditions during summer and the rains. It was clearly evident that the insect did not aestivate in the plains.

Arrangements were made for studying insect-affected potatoes from different parts of the Province, in order to find out if it had any important parasite. From the samples received up to the 30th June 1917, no parasite was obtained.

In the Insectary, observations were made on the life history of 25 insect pests and complete life histories of four of them worked out during the year.

III.—Crop Pests.

(*a*) *Major Campaigns.*

Agrotis ypsilon.—A campaign against Agrotis ypsilon was conducted at Ghogha and Colgong with 54 Andrés Maire traps, on the same lines as in previous years. The total number of moths destroyed by the traps during the season was 157,992 and handpicking accounted for the destruction of 470,196 caterpillars. The total damage done by the insect at Colgong amounted to 10 bighas only and at Ghogha about 330 bighas. The cost of the campaign was Rs. 1,135-9-6 including establishment and contingencies. The Pirpainty Concern contributed Rs. 100 towards the cost of the work at Colgong.

(*b*) *Other pests.*

The following minor pests were dealt with during the year :—

Paddy.—Pachydiplosis oryzace.—Rice stem fly was reported from Angul damaging paddy plants.

Ripersia sacchari, Gr.—Rice mealy bug was reported from Puri affecting paddy. It was recommended to let out the water from the affected plots. As a preventive method it was recommended to burn the grasses round the area, after harvest. The same pest also appeared on a plot of paddy in the Sabour Farm, but as the crop was very poor on account of the effects of flood, no action was taken.

Chilo simplex, But.—Moth borer attacked paddy in the Sabour Farm and was kept under control by the destruction of the affected plants.

Leptocorisa varicornis, F.—Rice bug was very bad in a large number of paddy plots in the Sabour Farm. It was completely controlled by Bagging before it could do any appreciable damage.

Wheat and Barley.—Agrotis ypsilon, Rott.—Greasy surface caterpillar was reported from the Tintanga Deara damaging wheat and barley. No action was taken as it was not possible to control this pest in the *chaur* lands unless preliminary arrangements had been made early in the season.

Maize.—Hieroglyphus furcifer, Serv.—Rice grasshopper was reported from Siwan, damaging maize, sugarcane, paddy, etc., in several villages in the subdivision. The area was visited and the method of controlling the pest by "Bagging" was demonstrated to the cultivators in the presence of the Subdivisional Officer. The method was greatly appreciated by the cultivators.

Chilo simplex, But.—Moth borer attacked the maize crop in Sabour Farm. It was controlled by destroying the first attacked plants. It was also reported from Pakour as damaging early irrigated maize. It was recommended to destroy the affected plants.

Millets.—White ant was very bad on experimental millets in the Botanical experimental area. It was completely checked by irrigation with Crude oil emulsion.

Pulses.—Diacrisia obliqua, Wlk.—Behar Hairy caterpillar appeared on Soybean in the Botanical experimental area and on *Kalai* in Sabour Farm, where it was controlled by handpicking in the cluster stage.

Sugarcane.—Cane borer attacked cane in the Sabour Farm and in the Botanical experimental area and was kept under control by timely handpicking.

Tobacco.—Agrotis ypsilon, Rott.—Report was received from Farka of Greasy surface caterpillar damaging tobacco seedlings. It was recommended to irrigate the squares heavily. The same pest also appeared on Tobacco on students' plots in the Sabour Farm where it was checked by handpicking.

Potato.—Phthorimoea operculella, Zell.—Assistance was given to the Deputy Director of Agriculture, Patna, in starting a potato storage demonstration godown at Pertabtand in the Hajipur Subdivision.

Stored grains.—In the Sabour Farm godown 957 maunds of stored grains were fumigated with Carbon bisulphide. Samples of Phaseolus seeds were fumigated before they were despatched to the Phillipine Islands.

Besides the above, some miscellaneous pests were dealt with during the year and inquiries attended to.

IV.—Teaching.

On account of the introduction of the two years' course which ran concurrently with the original three years' course, a larger number of hours had to be devoted to teaching. I was responsible for the teaching of Entomology and conducted the diploma examination.

V.—Publications.

The following papers were published or prepared during the year :—

Title.	Author.	Where published.
1	2	3
Agrotis at Colgong and Ghogha, 1915-16	H. L. Dutt, M.Sc., A.	Bihar Agricultural Journal, Volume IV, 1916.
The Greasy surface caterpillar, its life history and seasonal history.	Ditto ...	In the Press.

H. L. DUTT,
Assistant Professor of Entomology.

Annual report of the work done in the Botanical Section during the year ending 30th June 1917.

I.—Administration.

Charge.—Mr. E. J. Woodhouse, Economic Botanist, remained absent from duty and I remained in charge of the current duties of the office of the Economic Botanist throughout the year. Mr. H. L. Dutt remained in charge of the Entomological Section.

Tour.—I spent only seven days on tour in attending the mycological conference held at Pusa in February 1917.

Staff.—There has been no change in the staff which remained the same as last year. The post of Garden Overseer remained vacant during the period under review and the Mycological Fieldman remained absent from duty on medical leave practically throughout the year.

Leave.—The following officers were allowed to enjoy privilege leave during the year:—Babu Devabrata Mukherji, Assistant Professor of Botany, from 4th August 1916 to 10th August 1916 and from 16th April 1917 to 31st May 1917; Babu Mohendra Chandra Bhar, Draftsman, from 3rd May 1917 to 2nd June 1917; Babu Basanta Kumar Biswas, Clerk, from 2nd December 1916 to 23rd December 1916 and Babu Chaturbhuj Sahai, Garden clerk, from 5th June 1917 to 9th July 1917; Babu Jamini Bhusan Sinha, Mycological Fieldman, was granted medical leave from the 4th July 1916 to 3rd July 1917.

Office.—In all 1,696 letters were dealt with in the office. There was a considerable amount of typing of scientific matter. In the accounts department, excluding the pay of the Gazetted officers, Rs. 14,805-3-10 passed through the office. As usual many inquiries have been answered and large numbers of plants, seeds and specimens have been supplied to the public through the office. There was a particularly large demand for seeds of Soybean.

II.—Scientific and Research.

The varieties of Sugarcane were continued in pure culture. Large number of canes of all the pure varieties were supplied to the local farm for extensive trial. Similar trials in other divisions might lead to the discovery of the most profitable varieties suitable for such areas.

In the case of Soybeans, Mr. Ghosh was able to add seven new types by selection to the number of types which already existed last year, bringing the total up to 26 types. An early maturing and at the same time high yielding type has however yet to be discovered to make the cultivation of Soybean profitable in the plains.

The cultivation in pure culture of a large number of types and sub-types of *Kalai* (*Phaseolus mungo, Linn.*) and of *Mung* (*Phaseolus radiatus, Linn.*) has been carried on to compare their relative merits and to enable the Department to recommend definite types for general cultivation. So far *Chicknee Kalai* and *Kala Kalai* and early *Bhaddi Mung* and *Ghora Mung* have given indications of better results than other varieties at Sabour.

The *Kaoni* (*Setaria Italica*) and *Marua* (*Eleusine Coracana*) have similarly been isolated into types and sub-types and their cultivation carried on with a view to find out the most desirable types for general cultivation.

The work done on the fodder pulses *Meth* (*Phaseolus Ricciardianus, Fen*), *Bhringi* (*Phaseolus aconitifolius, Jacq.*) and *Mashyem Kalai* (*Phaseolus calcaratus, Roxb.*) has been fully dealt with in a contribution made in the Departmental journal.

The field and garden peas, of which altogether eleven varieties have been isolated, have been grown in pure cultures and some of the most promising varieties have been distributed for trial in the Province. The hybridization of some English peas with the Patna variety has given interesting results in the first generation.

Besides the above several varieties of beans, the brown and the white gram and a few other miscellaneous crops have also been grown in pure culture. The result of the work on Sweet Peas has been embodied in an article published in the Departmental Journal (*vide* Bihar and Orissa Agricultural Journal, Volume IV—1916).

In the herbarium 75 additions have been made during the year, bringing the total number of species in the collection to 3,301. The first part of the Sabour flora was completed by Babu Devabrata Mukherji in September last; but for want of funds the publication has been postponed. The second part of the flora has been taken up in hand and some progress has already been made in that direction. The study of the life history of local plants was continued and a paper on *Dalbergia Sissoo (Roxb.)* has been sent to the press for publication in the Departmental Journal. As usual the services of the Artist and the photographer were largely utilized by the officers of the Botanical section.

III.—Botanic Garden.

The ordinary routine duties of the Botanic Garden were carried on as usual by the staff of temporary *malis*. Head *Mali* Mukhtear Singh left Sabour in December 1916 on receiving an appointment at Quetta under the Political Agent and the post of Head *Mali* has been filled since January 1917, by Govinda Ram, a practical and experienced gardener, kindly sent by Mr. Hartless, Superintendent of the Government Gardens, Shaharanpur. Some plants have been added to the Botanic Garden and the compound in the west and south of the Insectary has been planted up with some desirable varieties of mango and other fruit trees. The grafts of apples, pears and plums obtained from Shaharanpur for trial have mostly been killed by white ants. The oranges, peaches and the grape vines are however doing well.

The Madras pattern one-man *moht* was introduced into the Botanical experimental area this year with satisfactory results.

The total recurring expenses of the Botanical and the Vegetable gardens and the Experimental area for the year under review amounted to Rs. 4,853-4-0. The income from all sources amounted to Rs. 251-3-3.

The work of the College grounds was carried on by a staff of temporary *malis* under the supervision of the Botanic Garden staff for which a separate report has been submitted to the Principal.

The Rotation experimental area was cultivated by the Botanic Garden staff according to the cropping scheme and the produces were made over to the Agricultural Chemist for examination.

The Honourable Member for Revenue and Agriculture, Government of India, visited the Botanic Gardens and the Botanical experimental area on the 28th December 1916 and the Director of Agriculture visited the gardens twice during the year under review.

IV.—Mycology.

Comparatively fewer specimens and reports on plant diseases were received during the year. Twenty-four specimens of the more common crop diseases were supplied to the Professor of Botany of the Presidency College, Calcutta.

V.—Education.

The teaching of Botany, Mycology, Horticulture and Plant Breeding was carried on as usual by the officers of the Botanical Section. The total number of hours devoted to these subjects were 19 per week. The diploma examination on Botany was held in March last and the result was duly notified to the Principal. Mr. D. Milne, Economic Botanist, Punjab, acted as the external examiner.

VI.—Publications.

The following papers have been published or have been prepared for publication during the year by the officers of the Botanical Section :—

Title.	Author.	Where Published.
Some Observations on the Life History of *Sisum* (*Dalbergia Sissoo—Roxb.*).	D. Mukherji, M.A. and J. M. Talukdar, B.A.	In the Press.
The Fodder Pulses, *Meth*, *Bhringi* and *Mashyem Kalai*.	A. C. Ghosh, M. Sc., A.	In the Press.
Sabour Flora, Part I ...	D. Mukherji, M.A.	In manuscript.

S. K. BASU,

Assistant Professor of Mycology, in charge.

Annual Report of the Professor of Agriculture, Sabour.

Charge.—The office of the Professor of Agriculture continued to remain in charge of Mr. Sil till the 10th January when I returned from Military duty and took over charge, Mr. Sil reverting to his former appointment of Assistant Professor of Agriculture. Mr. B. M. Chatterji was Farm Superintendent throughout the year, and was assisted by three overseers, Babu Jagat Mohan Dutta, Babu Ajodhya Prosad Ghose (on probation) and Babu Bejoy Kishore Mukherji (on probation). The first named overseer has recently been appointed as Superintendent of the Hazaribagh Reformatory School Farm.

Training.—Babu Nirmal Deb having passed the Diploma examination was awarded a scholarship of Rs. 40 per mensem, tenable for one year for a further training on the Sabour Farm, and has since been acting as District Agricultural Inspector in place of Babu Somesh Chandra Dutta, on medical leave.

Leave.—I continued to remain on furlough (Military duty) till the 10th of January 1917. Mr. Sil availed himself of one month's privilege leave from the 17th of April 1917.

Visitors.—The Farm was visited by the Hon'ble Sir Claude Hill, Revenue Member of the Government of India, the Director of Agriculture, Bihar and Orissa (twice), the Registrar of Co-operative Societies, the Officiating Registrar of Co-operative Societies and the Acting Deputy Director of Agriculture, Kankan Division.

Tours.—I was on tour for 25 days. Babu Jagat Mohan Dutta, 1st Overseer, for 26 days and Babu Ajodhya Prosad Ghose, 2nd Overseer, for 67 days in connection with the Jute Enquiry.

Education.—During the year there were four 3rd year students, ten 2nd year, and 20 1st year. Of these, the 2nd and 3rd year students were undergoing a three years' course under the old curriculum, while the 1st year entered under the new two years' course.

Examination.—In the Annual Examination for the Diploma only one student was successful in obtaining the Diploma, but three out of the four students satisfied the examiner in both theoretical and practical agriculture. This examination was conducted by Mr. W. Roberts, Principal and Professor of Agriculture of the Punjab Agricultural College, and Mr. Sil of this College. Of the 2nd year students two failed and of the first year seven failed. I think it would not be out of place to mention here that the whole professorial staff are unanimous in stating that the educational standard of the present student is far below that of the student who entered the College in previous years.

Short Course Students.—This course had to be abandoned in the *Bhadai* season for want of applicants as only one student applied for admission. For the *Rabi* Course two students were under training and completed their course in March. Last June, two students were also admitted for this season's *Bhadai* Course.

College Museum.—The Agricultural branch of the College Museum which was taken up by Mr. Sil in 1915 has added a fair number of models to the collection, but progress in this direction has been greatly retarded for want of an assistant to Mr. Sil.

Theoretical and practical work.—The same procedure of allotting individual plots to the 2nd and 3rd year students was continued, and the results of their cultivation was recorded in a prescribed form, a summary of which

is given in Table Nos. 1 and 2. The 1st year students were mainly occupied with general field work during the *bhadai* season, and in the *rabi* a small area was cultivated by them collectively. Arrangements were made of affording them an opportunity of studying intensive and extensive cultivation by personal experience.

The theoretical course of the 2nd and 3rd year students covered a wide area, and it is surprising that better marks were not obtained by the students at the annual examination. The first year theoretical course differs to a certain extent from the old course but the importance of this subject has been maintained by an additional number of hours being apportioned for it.

The short course students in addition to the practical training were given elementary lectures in the vernacular in Agriculture by Mr. Chatterjee.

Object-lesson plots.—The small area allotted for this purpose two years ago has been increased, and now besides demonstrating the fundamental principles of agriculture, shows all the important crops grown in the Province and it is contemplated to still further extend this area with a view to increasing the number of demonstrations. The work of this area is given in Table No. 3.

SABOUR FARM.

Cropped area.—The Sabour Agricultural Station is situated in Latitude 25·15 North and Longitude 87·2 East, and was established in 1907, both for experimental purposes and for affording a practical training to the students of the Agricultural College. The whole estate comprises an area of about 320 acres of which about 190 acres are under the Farm.

The cropped area comprises an acreage of 156 acres of which 114·05 acres were under *bhadai* crops, 27·70 acres under *Aghani* paddy, and 127·75 acres under *rabi*, 124·05 acres were double-cropped.

Soil.—The soil differs considerably in various sections of the farm but may be roughly classified as loamy, clay-loam, and clay. Most of the Northern area may be said to fall under the last named. A detailed analysis as published last year is given in Table No. 4 showing the variations in the more important food constituents.

Season.—Table III gives the distribution of rainfall for the year from which it will be observed that very heavy rain was received during the 2nd and 1st fortnights of July and August respectively, it having rained 20 of the 28 days of this period. This resulted in certain portions of the farm being flooded and the *bhadai* crop being seriously damaged. Heavy rain again fell in October, and delayed the *rabi* owings considerably, while the absence of rain for the next three months made it impossible to expect even a normal crop. The germination of the *rabi* crop was excellent but lack of moisture in January produced a stunted cereal crop with poorly developed grain, and a decreased yield of straw. Good falls of rain in May this year enabled early sowings to be made and the *bhadai* crop promises well, though the July rain for transplanting the *Aghani* paddy is being anxiously awaited south of the River Ganges.

Receipts and Charges.—In addition to the usual statement of "Receipts and Expenditure" submitted annually in this report, an additional statement is given below excluding the cost of control, but laying down separately the cost of the experimental and non-experimental areas. The former shows a loss of Rs. 1,100-11-0 and the latter a profit of Rs. 945-14-8 in spite of both the *bhadai* and *rabi* seasons being extraordinarily poor. Excluding the cost of control under normal conditions the profit from the non-experimental area should more than pay for the cost of the experimental work on the Farm, but last season's floods and the very poor *rabi* made it an impossibility this season.

Statement showing the receipts and expenditure of the Sabour Farm for the year 1916-17.

Receipts.	Amount. Rs. a. p.	Expenditure.	Amount. Rs. a. p.
Sale-proceeds of farm produce	4,736 11 8	*I.—Non-recurring* :—	
Miscellaneous receipts ...	570 8 9	Purchase of cattle	1,620 8 3
Sale-proceeds of old stores ...	238 4 0	Purchase of implements	1,010 5 3
Value of produce in hand ...	3,174 13 3	Laying out ...	481 0 2
Amount of outstanding bills	493 1 4	Railway and Steamer Freight	129 13 9
	9,213 7 0		3,241 11 5
Deduct :—		*II.—Recurring* :—	
Value of old produce, 1915-16	3,668 15 6	(*a*) *Office Expenses* :—	
Amount of outstanding bills on 1st July 1916 since realized.	328 0 6	Service postage, etc. ...	30 00
	3,997 0 0	Hot weather charges	19 11 6
Net receipts ...	5,216 7 0	Office Contingencies	306 12 3
		Miscellaneous	352 12 6
			709 4 3
		(*b*) *Superintendence and control* :—	
		Establishment	5,336 8 7
			5,336 8 7
		(*c*) *Experimental* :—	
		Purchase of Fertilizer	163 4 3
			163 4 3
		(*d*) *Cultivation* :—	
		Feed of cattle	654 14 9
		Purchase of seeds	105 12 6
		Wages of Cultivators	5,313 2 4
			6,073 13 7
		Total Expenditure	15,524 10 1

A statement showing the classification of the charges under Experimental and Non-experimental work at the Sabour Farm during the year 1916-17.

Experimental. (*Area* 148·59 *acres.*)	Amount. Rs. a. p.	Non-Experimental. (*Area* 129·31 *acres.*)	Amount. Rs. a. p.
Seeds	393 11 0	Seeds	362 8 9
Manures	624 7 0	Manures	294 15 5
Labour	1,740 0 9	Labour	970 2 8
Feed of cattle ...	712 6 11	Feed of cattle	535 6 10
Maintenance ...	25 8 7	Maintenance	40 6 2
Miscellaneous ...	...	Miscellaneous	...
Total ...	3,496 2 3	Total ...	2,203 7 10
Receipts ...	2,395 7 3	Receipts ...	3,149 6 6
Loss ...	1,100 11 0	Profit ...	945 14 8
	Total minus...	Rs. 154-12-4.	

Items "manures", "*Feed* of cattle" partly *include* labour.

Laying out work.—Practically the only important laying out work done during the year was the remaining reclamation work of the brick kiln area. About three acres of culturable land has been added as a result and the tank which was also made has been stocked with desirable fish this year. Table No. VII gives the details of work done under this head.

Purchase of cattle.—The 27½ pairs of old bullocks have been sold and replaced by new animals. During the year under report eight pairs were purchased for Rs. 1,620 and the remaining seven pairs of old bullocks were disposed of for Rs. 220. A statement of live stock on the Farm is given in Table No. VIII.

Implements.—A sum of Rs. 1,000 was spent on purchasing implements details of which are given below. The four Spring Tyned Cultivators have proved a success in that they bring the "Dhub-grass" to the surface and make it easy for the harrow to collect, besides which they do about three times the work of a country plough in upland areas. These implements should answer well in diara lands after ploughing and in Purnea district where this grass is difficult to control. The old sugarcane mills have been replaced by three "Banerjee" mills which have proved the most efficient.

All the old chaff cutters have been replaced by new ones, but their price along with the price of all other implements has increased considerably owing to the war.

Serial No.	Name of implement.	Number of implements.	Amount.	Remarks.
1	2	3	4	5
			Rs. a. p.	
1	Banerjee's Cane-crushing Mill	3 Mills ...	213 0 0	
2	Spring Tyned Cultivator	2 of 7 Tyned...	112 8 0	
3	Ditto	1 of 5 Tyned...	37 13 0	
		Total ...	333 5 0	

Seeds Store.—The Sabour Farm continues to provide a certain amount of reliable and improved seed to the public, but the supply is very limited and the question of Seed Farms will have to be taken up as soon as the District work develops. The amount of seed indented for and supplied to the public is given in Table No. VI. Certain observations are being made with regard to the storage of seed and most of the local practices have been included in the work.

Experiments.—The experimental work of the Farm continued on the same lines as of the previous years, but three new variety trials were started during the year with Barley, Sugarcane and Hibiscus and a feeding experiment with rice meal was also made. Rotation experiments have not been attempted at present owing to the unevenness of the soil, but an area of twelve acres is being treated for the last three years and has been reserved for this purpose.

1. *Hot Weather Cultivation.*—The cultivator unfortunately has to employ all his bullocks in the hot weather for thrashing his *rabi* crop and loses the advantage of opening up his land at this time of the year. When this is possible he never fails to do so, but the country plough fails to make much impression when the soil is so hard, and the results of this experiment give a true indication of the value of the iron plough. It will be observed that the effect of the value of the hot weather cultivation is nearly the same as

that of an application of 8,200 lbs. of cowdung manure, though the effect is not marked when the hot-weather cultivation is combined with manuring.

HOT WEATHER CULTIVATION.

Area, 15 acres. Crop, Pusa No. 12 Wheat (Triticum Sativum).

Serial No.	Factor in experiment.	Season, 1915-16.		Season, 1916-17.		Remarks.
		Grain.	Straw.	Grain.	Straw.	
1	2	3	4	5	6	7
		lbs.	lbs.	lbs.	lbs.	
1	Cultivated in April with country plough.	75	148	42	70	
2	Cultivated only in April with Punjab plough.	117	212	66	108	
3	Cultivated with the country plough in April and again at intervals of 3 weeks.	93½	73½	52	66	
4	Cultivated with the Punjab plough in April and again at intervals of 3 weeks.	100	224	68	158	
5	Cultivated with the Punjab plough in April and manured with 8,200 lbs. of cattle manure per acre.	143	228½	46	60	
6	Cultivated with the Punjab plough in April and again at intervals of 3 weeks and manured with 8,200 lbs. of cattle manure per acre.	107	156	68	84	
7	No hot weather cultivation but 8,200 lbs. of cattle manure applied per acre.	59	99½	66	105	
8	No hot weather cultivation and no manure.	56	101	46	78	

II.—Paddy (*Oryza Sativa*).

A continuation of the last three years' work confirms the report submitted in 1913-14, viz., that the single seedling transplanting cannot be generally adopted in South Bihar. Many other factors were included in the investigation and this year's results show—

(*i*) That so far as the strength of seedlings is concerned the "single" seedling system, excepting in one instance, did not do better than the bunch system and the density of the seed bed appears to have very little influence over the performance of seedlings subject to a limit of 820 lbs. of seed per acre in the seed bed.

(*ii*) That so far as the date of transplanting is concerned the "single" system and the bunch system will give the same results if the transplanting is made early in the season, but the outturn of the former diminishes relatively as the date of transplanting gets later, and this decrease was very evident in the 4th transplanting that was made.

(*iii*) That seedlings six weeks old appear to do best in the case of an early transplanting, but if the season is advanced seedlings 8 to 10 weeks old should be transplanted.

(*iv*) That in the manured plots the "single" system gives better results than the bunch system.

(*v*) That in the spacing factor the "single" system does better than the bunch system only in No. 21, i.e., where the spacing was 18″ apart, but the total yield in this case was considerably less than in Nos. 18 and 19 where the spacing was 6′ and 9″ apart respectively.

SEEDLING EXPERIMENT WITH PADDY (*ORYZA SATIVA*).

Area $\frac{1}{40}$th acre. Variety Kalamdan, a meaium Amin.

The following table gives the results:—

Serial No.	Factor in the experiment.	Average outturn in pounds.				Remarks.
		1 and 2 seedlings single.		4 and 6 seedlings bunch.		
		Grain.	Straw.	Grain.	Straw.	
1	2	3	4	5	6	7
		lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	
1	Unmanured seed-bed, seed rate 164 lbs. per acre.	29 12	58 2	25 0	66 6	
2	Manured seed-bed, seed rate 164 lbs. per acre.	27 4	64 10	31 12	62 4	
3	Unmanured seed-bed, seed rate 328 lbs. per acre	23 2	48 8	28 12	58 2	
4	Manured seed-bed, seed rate 328 lbs. per acre.	23 4	56 5	31 0	70 2	
5	Unmanured seed-bed, seed rate 820 lbs. per acre.	29 4	62 15	30 8	73 6	
6	Manured seed-bed, seed rate 820 lbs. per acre	28 0	63 1	30 14	77 2	
7	First transplantation age of seedlings, 6 weeks.	31 10	71 6	31 14	81 8	Date of transplantation, 15th July 1916.
8	Second transplantation, age of seedlings, 6 weeks.	26 8	49 8	32 14	54 6	Dateof transplantation, 31st July 1916.
9	Second transplantation, age of seedlings, 8 weeks.	29 6	56 8	34 6	67 12	Ditto.
10	Third transplantation, age of seedlings, 6 weeks.	11 2	24 2	17 2	28 10	Date of transplantation, 15th August 1916.
11	Third transplantation, age of seedlings, 8 weeks.	32 6	40 4	38 14	50 2	Ditto.
12	Third transplantation, age of seedlings, 10 weeks.	35 10	64 6	38 8	59 11	Ditto.
13	Fourth transplantation, age of seedlings, 6 weeks.	13 14	28 0	22 8	37 8	Dateof transplantation, 31st August 1916.
14	Fourth transplantation, age of seedlings, 8 weeks.	21 10	35 4	29 10	42 8	Ditto.
15	Fourth transplantation, age of seedlings, 10 weeks.	14 10	25 14	22 12	38 14	Ditto.
16	Fourth transplantation, age of seedlings, 12, weeks.	7 6	19 8	10 12	22 0	Ditto.
17	Manured with 8,200 lbs. of cattle manure and 820 lbs. of castor cake per acre.	38 4	82 4	36 4	97 0	
18	Spacing 6 inches	34 12	81 8	36 12	88 14	
19	Spacing 9 inches	30 6	64 8	37 2	74 12	
20	Spacing 12 inches	25 15	49 2	30 5	56 6	
21	Spacing 18 inches	22 6	52 0	14 0	41 2	
22	Dry seed-bed	6 0	21 0	8 12	30 8	Considerably damaged by flood.
23	Wet seed-bed	4 0	9 2	6 4	15 12	Ditto.

III.—Date of transplanting paddy (*Oryza sativa*).

The same conclusions were arrived at as last year, viz. :—

(i) That with the same number of seedlings the yield falls off as the season for transplanting advances.

(ii) That as the season for transplanting advances six to eight seedlings per hole give a very much better yield than two seedlings.

Area—$\frac{1}{10}$th acre. Variety—Kalamdan—a medium Aman.

Serial No.	Factor in the experiment.	Outturn in pounds.								Remarks.
		2 Seedlings.		3 Seedlings.		4 Seedlings.		6 Seedlings.		
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	
1	2	3	4	5	6	7	8	9	10	11
		lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz	lbs. oz.	lbs. oz.	
1	10th July transplantation ...	136 0	199 2	155 4	227 8	183 4	293 3	156 0	242 10	
2	25th „ „ ...	147 6	168 4	182 4	216 1	177 12	279 4	116 0	205 3	
3	10th August „ ...	103 0	233 0	170 0	254 8	137 8	206 5	142 0	227 10	
4	25th „ „ ...	130 12	201 0	103 4	146 4	*90 12	222 14	139 0	221 9	*Damaged

IV.—Alternate and continuous Green-manuring with Sun-hemp (*Crotolaria juncea*) in conjunction with lime and bone-meal.

This year's results show that continuous green manuring of paddy land gives a heavier yield than manuring every alternate year, and that continuous green manuring with an addition of bone-meal is better than either green manuring alone or in conjunction with lime.

Serial No,	Factor in the experiment.	Outturn in pounds.						Remarks.
		With lime.		With bone-meal.		Green manuring alone.		
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	
1	2	3	4	5	6	7	8	9
		lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	
1	Alternate green manuring	31 0	339 0	412	334 8	35 2	229 12	The straw growth had been excessive and could not be properly dried before weight.
2	Continuous do. ...	41 0	287 4	52 8	316 0	46 12	303 10	

V.—Bone-meal and Saltpetre on paddy.

From the Table below the following conclusion appears to be warrantable, viz. :—Continuous applications of 82 lbs. of bone-meal with 41 lbs. of Saltpetre per acre or alternate applications of only 246 lbs. of bone-meal per acre appear

to be better than an application of 410 lbs. of bone-meal per acre only in four years.

Area—$\frac{1}{10}$th acre. Variety—Kajerghore—(a coarse late Aman).

Serial No.	Factor in the experiment.	Outturn in pounds.		Previous Manuring.
		Grain.	Straw.	
1	2	3	4	5
		lbs. oz	lbs. oz.	
1	No fertilizer in 1916-17 ...	166 8	245 8	246 lbs. of bone-meal per acre in 1913-14. No fertilizer in 1914-15. 246 lbs. of bone-meal per acre in 1915-16.
2	82 lbs. bone-meal and 41 lbs. Saltpetre per acre in 1916-17.	162 8	273 0	82 lbs. of bone-meal and 41 lbs. of Saltpetre per acre in 1913-14. 82 lbs. of bone-meal and 41 lbs. of Saltpetre per acre in 1914-15. 82 lbs. of bone-meal and 41 lbs. of Saltpetre per acre in 1915-16. 82 lbs. of bone-meal and 41 lbs. of Saltpetre per acre in 1916-17.
3	No fertilizer in 1916-17 ...	133 0	312 2	410 lbs of bone-meal per acre in 1913-14. No fertilizer in 1914-15, 1915-16 and 1916-17.
4	No fertilizer in 1916-17 ...	136 8	210 12	No fertilizer since 1913-14.

VI.—Method of planting paddy (*Oriza Sativa*)

The superiority of transplantation over broad-casting or dibbling is again demonstrated this year.

Area—$\frac{1}{10}$th acre. Varieties—Kajerghore (Coarse late Aman).

C. P. Aus (Fine Aus).

Benibhog (Medium Aus).

Serial No.	Factor in the experiment.	Outturn in pounds.						Remarks.
		Kajerghore.		C. P. Aus.		Benibhog.		
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	
1	2	3	4	5	6	7	8	9
		lbs. oz.	lbs. oz	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	
1	Broadcasting ...	Nil*	Nil*	16 3	263 3	8 8	208 4	* Failed.
2	Dibbling ...	Nil*	Nil*	38 10	573 12	13 8	270 4	
3	Transplanting ...	161 12	296 4	50 13	418 12	38 0	564 0	

VII.—Variety trial with Phillipine paddies.

From the figures it would be evident that none of the Phillipine varieties are as good as the Farm standard ones, though the two early Amans (P. 530 and P. 663) approach very near the Farm standard variety—"Dahia."

Area—$\frac{1}{10}$th acre. Seven Phillipine varieties of paddy were compared with the standard early and late Amans of the Farm.

Serial No.	Names and numbers of paddy varieties.	Outturn in pounds.		Remarks.
		Grain.	Straw.	
1	2	3	4	5
		lb. oz.	lb. oz.	
1	Macan Pina P 530 ...	120 0	238 10	
2	Panni P 663	119 0	205 8	
3	Dahia	125 8	305 0	Standard early Aman of the Farm.
4	Inasimang P 447	81 12	169 0	
5	Mulanay P 635	87 0	174 0	
6	Senera II P 813	77 12	155 0	
7	Kalamdan	169 4	284 10	Standard late Aman (medium) of the Farm.
8	Macan P 527	103 0	229 0	
9	Pinling Daniel P. 632 ...	42 8	101 0	
10	Kajerghore	129 0	244 0	Standard late Aman (coarse) of the Farm.

VIII.—Liming on *Marua* (*Eleusine coracana*) and Oat (*Avena sativa*).

As the *Marua* crop may be looked upon as a failure, it is not safe to draw any definite conclusion of the effect of lime on it. But on oats, the effect of slaked lime every three years is more marked than the other applications.

Area—0·15 acre. Crops *Marua* and Oat.

Serial No.	Factor in the experiment.	Outturn of *Marua* in pounds.		Outturn of Oat in pounds.		Remarks.
		Grain.	Straw.	Grain.	Straw.	
1	2	3	4	5	6	7
		lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	
1	2,735 lbs. slaked lime per acre every alternate year.	16 2	162 8	47 0	71 0	The rate of application of lime in each case was 410 lbs. to each plot.
2	2,735 lbs. quicklime per acre every alternate year.	13 4	126 10	47 0	71 0	
3	2,735 lbs. slaked lime per acre every 3 years.	12 4	123 0	72 0	112 0	
4	2,735 lbs. quicklime per acre every 3 years.	6 6	131 11	52 0	90 0	
5	2,735 lbs. quicklime per acre every year.	12 4	108 15	51 0	82 0	
6	No lime	5 12	107 3	37 0	71 0	

IX.—Variety and date of planting trials with tobacco (*Nicotina sp.*)

Though the crop was not so good as was expected yet in general the results show that the variety-Sumatra is better than the others and that Pusa No. 28 did not do very well as compared with the other varieties. So far as the date of transplantation is concerned, the mid-date proved on the whole better than either early or late ; but Sumatra, Deshi, and White Burley did well at the early transplantation while Pusa No. 28, and Bhengi at the late transplantation ; contrary to expectation the Local Bilaty did badly at the late transplantation.

Area :—·07 acre.

Serial No.	Names of varieties.	Outturn of cured leaves in pounds,			Remarks.
		Early transplantation.	Mid-date transplantation.	Late transplantation.	
1	2	3	4	5	6
		lbs. oz.	lbs. oz.	lbs. oz.	
1	Pusa No. 28	4 10	11 8	10 12	
2	Little Flemingo ...	7 0	8 0	8 0	The field was green manured with *Dhanicha* during the *Bhadai* Season.
3	White Burley... ...	13 8	14 0	10 0	
4	Local Deshi	17 0	12 0	9 12	
5	Sumatra	26 0	24 0	12 0	
6	Bhengi	11 4	14 12	14 0	
7	Local Bilaty	8 0	12 0	7 0	

X.—Variety trial with Pusa wheats (*Triticum sativum*).

This year, Pusa Nos. 8, 106 and 110 did slightly better than Pusa No. 12 and the outturn of the local variety was the same as that of Pusa No. 12.

Area—0·03 acre.

Serial No.	Name of variety.	Outturn in pounds.		Remarks.
		Grain.	Straw.	
1	2	3	4	5
		lbs. oz.	lbs. oz.	
1	Pusa No. 6	11 8	19 0	
2	„ „ 7	13 8	23 0	
3	„ „ 8	17 9	29 0	
4	„ „ 12	16 8	28 8	
5	„ „ 106	17 8	27 8	
6	„ „ 110	17 0	27 8	
7	Local	16 8	32 0	

XI.—Variety trial with barley (*Hordeum Vulgare*).

The results show that four of the United Provinces' barleys are decidedly superior to the local one so far as their relative outturns are concerned. This variety trial will be continued this year.

Area—0·03 acre.

Serial No.	Name of variety.	Outturn in pounds.		Remarks.
		Grain.	Straw.	
1	2	3	4	5
		lbs. oz.	lbs. oz.	
1	Improved Partabgarh	17 4	28 0	
2	Sultanpur	17 4	31 0	
3	Azamgarh	12 8	24 8	
4	Ballia	8 0	15 8	
5	Punjab	15 0	25 0	
6	Red Huskless	6 8	13 0	
7	Green Huskless	5 6	10 8	
8	White Huskless	0 12	5 8	
9	Kashmir	Nil.	7 4	Failed
10	Local	9 14	18 2	

XII.—Trial with Pusa Hisbiscus (*Hibiscus Cannabinus*).

From the outturns obtained it cannot be said that Hisbiscus did well as a fibre crop when grown alone. Also there is very little difference between the local and the Pusa variety in fibre outturns, but the former gave more seed than the latter. The fibre obtained from both at the flowering stage was softer or glossier than that obtained at the later stage.

Area—·10 acre.

Serial No.	Factor in the experiments.	Variety.	Outturn in pounds.			Remarks.
			Fibre.	Pith.	Seeds.	
1	2	3	4	5	6	7
			lbs. oz.	lbs. oz.	lbs. oz.	
1	Harvested at the flowering stage.	Pusa No. 5 ...	12 0	74	Nil.	
2	Harvested when the fruit is ripe.	Do. ...	11 8	79 0	3 0	
3	Harvested at the flowering stage.	Local ...	11 10	52 12	Nil.	
4	Harvested when the fruit is ripe.	Do. ...	11 4	58 14	13 15	

XIII.—Variety trial with *Rahar* (*Cajanus indicus*).

Three varieties, viz., Saran Select, Local and *Aghani* (early), were tried as usual, but heavy showers after sowing, and again after germination damaged the crop considerably. Though the crop was a failure, still the Saran Select proved superior to the other varieties under the most unfavourable conditions.

XIV.—Seed Production of Sanhemp (*Crotolaria juncea*).

In this experiment also the crops failed owing to unfavourable weather conditions. The experiment was continued in mixtures as in previous years, viz., Sanhemp alone, Sanhemp *Juar* and *Rahar*, Sanhemp and *Rahar*. The last mixture, viz., Sanhemp and *Rahar* proved to be better than the other two under the unfavourable conditions that prevailed during this year.

XV.—Soil fertility trials.

The experiments here continued as in previous years with a view to finding out the fertility conditions of the several plots before starting any experiment.

XVI.—Observational experiments with paddy.

The experiments were carried on as in previous years. The results showed again (1) that paddy seedlings can be kept inside iron bins within a hot godown—the temperature under the bin varying from 97° F. to 112° F. during the period of trial—with about 25 per cent damage; and the uprooted seedlings can be best kept for some time (ten days) with their roots dipped in water.

(2) Regarding the economic limit of the number of seedlings to transplant per hole, 1 or 2 for the selected seedlings and 6 for the unselected seedlings appeared to be best.

(3) Pruning the roots of seedlings does not do them any harm. On the other hand the pruned seedlings did better than unpruned ones.

(4) The paddy cuttings made of old seedlings did better than either old or young whole seedlings; but the root stubbles failed.

(5) The strong seedlings showed greater power of performance than the weak ones and the performance of seedlings from thick seed beds (820 lbs. per acre) proved to be poor performers as compared with those of thin seed-bed (viz., 164 or 328 lbs. per acre) ones.

(6) That tillerings can be effectively separated and planted, and in fact the tillerings gave larger outturns than either the tillered or untillered seedlings.

XVII.—Cattle feeding trials with Rice-meal.

The rice-meal used in the experiment was received from the North Champaran Development Company, Sikta. As the object of the experiment was to test the feeding value of rice-meal, it was compared with the oat grain—the concentrate which was used throughout the experiment as the standard one for the farm animals for the time being. The feeding trials were made both on the milch and draft animals of the Sabour Farm and lasted for 16 weeks in the case of milch cows, and four weeks in the case of draught bullocks. In the case of cows, five were selected. Three of them were at an early stage of their lactation period at the commencement of the trial, while the remaining two were about two months in advance. As the milk yield naturally falls off and the percentage of fat increases with the advance of the lactation period, rice-meal was fed to the animals during the first four weeks and last four weeks, while the standard concentrate, i.e., oat grain was given during the middle eight weeks. By this arrangement the disturbing effects due to the advance in the lactation period were eliminated as far as possible. The rations of both the dairy and work animals was computed according to the Wolff-Lehman Standard with the help of the "Table of average Digestible nutrients" as given by Henry (vide

Henry's "Feeds and Feeding"). The daily ration of each cow consisted of 3 lbs. of rice-meal or 2½ lbs. of oat grain in turn with about 12 lbs. of mixed *bhusa* of wheat, oat and *rahar* in each case (exact quantities of roughage consumed were noted in the case of every animal. The cows were allowed grazing in localized areas for a certain number of hours every day. In the case of draught bullocks, 24 were selected. They were divided into three groups depending on the amount of work they had to perform (I—Heavy-worked, II—Medium-worked, III—At rest); and each group was divided into two lots, the first lot was fed on oat and the second lot on rice-meal. The roughage allowed to the bullocks varied from 30 lbs. to 11 lbs. daily mixed *bhusa* depending on the live-weight of the animals and the nature of work they had to perform. For half the animals of each group the concentrates consisted of 2 lbs of oat and 1 lb. of mustard cake daily, excepting in the case of animals at rest which were given only 2 lbs. of oat per head per diem.

In the case of the dairy animals, their individual live-weights were taken every week and their individual weekly milk yields recorded. Fat determinations in milk were also made on several occasions during each period of trial by the Agricultural Chemist, Bihar and Orissa. In the case of the draught bullocks, their individual live-weights were taken every week and observations were made on their general condition. The following table gives a summary of the results of the experiments:—

I.—Effect of rice-meal on milch cows.

Serial No.	Factor in the Experiment.	Live-weight in lbs.	Milk yield in lbs.	Fat content.
1	2	3	4	5
			lbs. oz.	
1	Before experiment ...	3,078	.....	4·46%
2	First rice-meal period, 4 weeks	3,014	1,807 12	4·25%
3	Oat period, 8 weeks ...	3,017	2,864 0	5·63%
4	Last rice-meal period, 4 weeks	2,906	1,037 15	5·37%
5	Remarks ...	Average of weekly weights.	Total of rice-meal period, 2,845—11.	

II.—Effect of rice-meal on draught bullocks.

Serial No.	Kind of draft bullocks.	Weight in lbs.				Loss (−) or gain (+) per animal in lbs.	
		Before experiment.	During oat period.	Before experiment.	During rice-meal period.	In oat period.	In rice-meal period.
1	2	3	4	5	6	7	8
1	Heavy-worked	778	760	824	786	−18	−38
2	Medium-worked ...	690	686	694	684	−4	−10
3	At rest	618	632	660	666	+14	+6

From the above results the following conclusions appear to be justified :—

(1) That generally rice-meal alone cannot very well take the place of oats in feeding cows in full milk without detriment to their general condition and the quantity and quality of milk produced though its effect on the quantity of milk produced is not very marked.

(2) That for heavy-worked bullocks, rice-meal cannot be safely substituted for oat even when supplemented with one pound of mustard-oil cake without a gradual deterioration of the animals.

(3) That from considerations of cost and the presence of nutrients, the ricemeal from Sikta may find a great support amongst stock-feedersbut for its effective use it would be well to compound it with nitrogenous foods.

This experiment will be continued this year.

Silage.—Silage was again prepared this year from *juar* in 10 feet pits dug in the ground, as well as in the large masonry silo pit. The resulting silage was a success in spite of the heavy rains, and this method of conserving green fodder is being demonstrated at one or two centres in the south of the Bhagalpur Division. The cost generally works out to about 8 pies per 24 lbs. (daily allowance) including the initial cost of digging the pit.

Cost of manufacturing silage in pits.

	Cost of harvesting.	Cost of cartage to pit.	Cost of chuffing, weighing and filling.	Cost of pressing.	Cost of covering.	Initial cost of digging the pit 10' deep with 12' diameter.	Total cost number of pounds of silage obtained.	Amount of silage obtained.	Cost per 24 lbs. (daily allowance of animal).
1	2	3	4	5	6	7	8	9	10
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	lbs.	Pies.
				FIRST YEAR.					
Pit No. 1	5 4 6	5 15 6	12 9 7	1 10 0	3 7 7	5 10 11	34 9 9	16,000	9
Do. 2	6 8 8	4 13 11	11 15 0	2 2 0	2 10 11	4 15 0	33 1 6	16,000	8
Do. 3	8 7 8	5 8 6	12 13 5	4 7 10	3 11 5	4 11 3	39 12 1	16,000	11*
Do. 4	7 0 8	2 9 3	9 12 6	1 12 0	2 6 6	4 11 3	28 4 2	16,000	8
				SECOND YEAR.					
Pit No. 1	4 14 3	3 13 2	12 5 10	5 6 7	3 1 10	Nil	29 9 8	16,000	8
Do. 2	2 7 0	3 1 4	9 12 0	4 11 3	7 7 7	Nil	27 7 3	16,030	7
Do. 3	4 4 7	3 14 0	10 2 8	4 8 2	4 12 6	Nil	27 9 11	16,600	7
Do. 4	5 4 4	3 3 9	11 4 5	4 13 6	10 9 8	Nil	35 3 8	16,830	9

* Work was rejected and had to be redone.

The Sabour Dairy.

The Dairy at Sabour is maintained under a separate grant and is under the management of the Farm. The herd originally consisted of one bull and 11 cows, all of the Montgomery breed, which were purchased from Pusa at a total cost of Rs. 884-5-0. The total number of animals which have been raised on the Farm (*vide* Table No. IX) to the end of June 1917, is 71, excluding 12 animals which have died within the 6½ years. The maintenance of a careful record of the milking qualities of the cows enabled Government to sell off the undesirable animals, and the present herd consists of 4 bulls, 10 cows, 12 bull-calves and 14 cow-calves ; three and a half pairs of Montgomery bullocks have also been obtained and made over to the Farm. I regret to have to report the loss of the best cow of the herd "Dudhi" from old age, and also the Australian cow "Mikey" from the same cause. The latter, however, left a half-bred cow-calf, her father being the Montgomery bull "Chattoo" (P 20) and this calf has been crossed by the Montgomery bull "Mithoo" (104 P) this year.

Table No. IX shows the increase of the herd since 1910-11, while Table No. X is a copy of the Lactation Register and shows the profit obtained from each cow Table No. XI gives the detail of the milk yield of the cows.

The milk yield of the herd amounted to 16,110 lbs. against 18,780½ lbs. produced last season. The reason for this decrease is due to the age of the animals, as four of the six cows which were in milk are of the Pusa stock of 1910. The receipts, however, show only a deficit of Rs. 138. The valuation of the stock is figured at Rs. 3,925-5-3, showing that the dairy stock has increased in value to the amount of approximately Rs. 505.—

Statement showing receipts and expenditure of the Sabour Dairy, 1916-17.

Receipts.	Amount.	Expenditure.	Amount.
1	2	3	4
	Rs. a. p.		Rs. a. p.
Sale of milk and stock ...	1,520 15 9	Attendance	182 15 0
Outstanding bills ...	39 3 9	Course feed	617 5 4
		Concentrate and salt ...	791 14 2
Total ...	1,560 3 6	Appliances	43 4 6
		Medical treatment ...	76 2 6
Deduct—		Miscellaneous ...	21 7 3
Outstanding on 1st July 1916 and since realized.	161 0 9		
Net receipts ...	1,399 2 9	Total ...	1,733 0 9

Valuation Statement of the Sabour Dairy Herd (1916-17).

Kind of Stock.	Valuation in—		Increase + Decrease—.	Remarks.
	1915-16.	1916-17.		
	Rs. a. p.	Rs. a. p.	Rs. a. p.	
Old herd at Rs. 10 per cent depreciation.	425 5 3	324 5 3	—101 0 0	1 Cow (Dudhi) worth Rs. 15 died during the year.
				1 Cow (Bijli) with her calf for Rs. 50 was sold during the year.
Value of the stock raised during 1912-13.	1,530 0 0	1,530 0 0	...	1 Cow (Kabai) for Rs. 80 was sold during the year.
Value of the stock raised during 1913-14.	930 0 0	1,170 0 0	+240 0 0	1 Bull (Krishna) for Rs. 150 was sold during the year.
Value of the stock raised during 1914-15.	350 0 0	530 0 0	+180 0 0	
Value of the stock raised during 1915-16.	164 0 0	230 0 0	+45 0 0	1 Bull (calf) worth Rs. 40 died during the year.
Value of the stock raised during 1916-17.	...	141 0 0	+141 0 0	
Total ...	...	3,925 5 3	+505 0 0	

A certain loss is experienced to the herd by keeping mature bulls at Sabour, and it would be as well to dispose of these animals if an opportunity offers. Table No. XII shows the animals disposed of to the public during the year and the amounts realized for them.

N. S. McGOWAN,
Professor of Agriculture.

TABLE

Statement showing the cost of cultivation, outturn, profit, loss, etc.,

Serial No.	Name of student.	Area.	Plot No.	Crop,	Cost of cultivation.		Total cost.
					Personal labour.	Farm labour.	
1	2	3	4	5	6	7	8
		B. ct.			Rs. a. p.	Rs. a. p.	Rs. a. p.
1	Himadrik Chandra Gupta.	0 10	A 41/1 ...	Gram ...	0 13 0½	0 12 11	1 9 11½
				Barley ...	...	...	...
	Ditto ...	0 10	A 41/2 ...	Wheat ...	0 6 0	1 0 3	1 6 3
2	M. C. Gogai ...	0 10	A 38/1 ...	Gram ...	0 6 0	1 1 8	1 8 6
				Barley ...	...	...	...
	Ditto ...	0 10	A 38/2 ...	Wheat ...	0 3 9	1 12 1½	1 15 10½
3	Krishna Chandra Pal	0 10	A 40/1 ...	Gram ...	0 4 0	1 0 9	1 4 9
				Barley ...	...	...	...
	Ditto ...	0 10	A 40/2 ...	Wheat ...	0 15 4	1 3 11	2 3 3
4	Anilanda Sen Gupta	0 10	A 40/1 ...	Gram ...	0 7 10	0 14 2	1 6 0
				Barley ...	...	...	...
	Ditto ...	0 10	A 40/2 ...	Wheat ...	0 10 6	1 4 11	1 15 5
5	Harinarain Pal ...	0 10	A 42/1 ...	Gram ...	0 9 9	1 4 2	1 13 11
				Barley ...	...	...	...
	Ditto ...	0 10	A 42/2 ...	Wheat ...	0 4 6	2 1 11	2 6 5
6	Protap Ch. Roy ...	0 10	A 46/1 ...	Barley ...	1 9 10¼	0 15 ¾	2 8 11
	Ditto ...	0 10	A 46/2 ...	Oats ...	1 10 9¼	0 14 1¾	2 8 11
7	L. L. Reade ...	0 10	A 37/1 ...	Gram ...	0 3 9	0 15 6	1 3 3
				Barley ...	...	...	...
	Ditto ...	0 10	A 37/2 ...	Wheat ...	0 3 0	1 5 2	1 8 2
8	Monindra Mohan Mustafi.	0 10	A 39/1 ...	Gram ...	0 6 8⅓	1 3 5	1 10 1½
				Barley ...	...	...	...
	Ditto ...	0 10	A 39/2 ...	Wheat ...	0 3 4½	2 0 8	2 4 0½
9	Kamini Kumar Dey	0 10	A 43/1 ...	Gram ...	0 11 6	0 10 2	1 5 8
	Ditto ...	0 10	A 43/2 ...	Wheat ...	0 15 8⅓	1 2 6⅓	2 2 3

I.

of the students' area for the rabi *season during the year* 1916-17.

Outturn of grain and straw.		Rate per 82 lbs.		Value of out-turn.	Profit.	Loss.	Remarks.
		Grain.	Straw.				
9	10	11	12	13	14	15	16
lbs. oz.	lbs. oz.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
36 0	61 0	3 0 0	0 4 0	3 8 4	1 14 4½	...	
55 0	103 0	2 8 0	0 4 0	...	...	...	
59 0	65 0	4 0 0	0 4 0	3 1 1	1 10 10	...	Cost of green manuring in *bhadai* included in *rabi*.
47 0	96 0	3 0 0	0 4 0	3 0 5	1 7 11	...	
32 0	45 0	2 8 0	0 4 0	...	...	...	
57 0	84 0	4 0 0	0 4 0	3 0 10	1 0 11½	...	Ditto.
34 6	55 0	3 0 0	0 4 0	2 2 7	1 13 10	...	
47 0	96 0	2 8 0	0 4 0	...	...	...	
55 5	88 0	4 0 0	0 4 0	2 15 6	0 12 3	...	Ditto.
28 10	41 0	3 0 0	0 4 0	2 11 9	1 5 9	...	
41 0	100 6	2 8 0	0 4 0	...	...	...	
45 0	75 6	4 0 0	0 4 0	2 6 11	0 7 6	...	Ditto.
36 14	57 6	3 0 0	0 4 0	5 8 2	3 10 3	...	
57 6	108 8	2 8 0	0 4 0	...	...	...	
116 12	170 0	4 0 0	0 4 0	2 3 5	...	0 3 0	Ditto.
61 0	116 0	2 8 0	0 4 0	4 1 5	1 8 6	...	Ditto.
28 0	41 0	3 0 0	0 4 0	1 2 9	...	1 6 2	
30 12	43 0	3 0 0	0 4 0	4 6 3	3 3 0	...	
45 0	86 0	2 8 0	0 4 0	...	...	...	
71 12	82 0	4 0 0	0 4 0	3 11 11	2 3 9	...	Ditto.
26 8	38 12	3 0 0	0 4 0	2 11 5	1 1 3½	...	Ditto.
45 0	88 0	2 8 0	0 4 0	...	...	...	
43 0	59 6	4 0 0	0 4 0	2 4 4	0 0 3½	...	Ditto,
22 0	41 0	3 0 0	0 4 0	2 10 8	1 5 0	...	
24 0	53 0	4 0 0	0 4 0	1 5 9	...	0 12 6	Ditto.

TABLE No. II.

Showing the cost of cultivation, outturn, profit, loss, etc., of the students' area for the *Bhadai* season during the year 1916-17.

Serial No.	Names of students.	Plot number.	Area.	Crop.	Cost of cultivation.		Total cost.	Outturn.	Rate per 82 lbs.	Value of outturn.	Profit.	Loss.	Remarks.
					Personal labour.	Farm labour.							
					Rs. a. p.	Rs. a. p.	Rs. a. p.	lbs. oz.	Rs. a.	Rs. a. p.	Rs. a. p.		
1	H. K. C. Gupta	A 41/1	0—10	Juar	0 13 1	1 6 7	2 3 8	1,640 0	0 2 0	2 8 0	0 4 4	...	
		A 41/2	0—10	Dhaincha	0 6 2	0 5 2	0 11 4	...	...	...	...	...	Ploughed in.
2	M. C. Gogai	A 38/1	0—10	Juar	0 9 8	1 0 8½	1 10 5	1,066 0	0 2 0	1 10 0	...	0 0 5	
		A 38/2	0—10	Dhaincha	0 6 0	0 4 9½	0 10 9½	...	...	...	...	...	Ploughed in.
3	K. C. Pal	A 40/1	0—10	Juar	1 1 9	1 15 0	3 0 9	1,558 0	0 2 0	2 6 0	...	0 10 9	
		A 40/2	0—10	Dhaincha	0 6 9	0 5 10	0 12 7	...	...	...	...	...	Ploughed in.
4	A. N. Sen Gupta	A 45/1	0—10	Juar	2 1 10	3 7 4	5 9 2	2,496 0	0 2 0	3 12 11	...	1 12 3	
		A 45/2	0—10	Dhaincha	0 4 1	1 8 11	1 13 0	...	...	...	...	...	Ploughed in.
5	H. N. Pal	A 42/1	0—10	Juar	1 0 6	1 9 6	2 10 0	3,362 0	0 2 0	5 2 0	0 2 8	...	
		A 42/2	0—10	Dhaincha	0 10 6	0 7 3	1 1 9	...	...	...	...	...	Ploughed in.
6	P. C. Ray	A 46/1	0—10	Dhaincha	1 0 6	1 9 6	2 10 0	...	...	...	...	...	Ploughed in.
7	L. L. Reade	A 37/1	0—10	Juar	0 8 10	1 7 10	2 0 8	14,76 0	0 2 0	2 4 0	0 3 4	...	
		A 37/2	0—10	Dhaincha	0 3 2	0 3 5	0 6 7	...	...	...	...	...	Ploughed in.
8	M. M. Mustafi	A 39/1	0—10	Juar	1 5 1	2 1 5	3 6 6	2,316 8[illegible]	0 2 0	3 8 6	0 2 0	...	
		A 39/2	0—10	Dhaincha	0 4 6	0 9 7	0 14 1	...	...	...	...	...	Ploughed in.
9	J. N. Gupta	...	...	.....	...	...	...	...	...	...	...	...	Did not do anything.

TABLE No. III.

Object-Lesson Plots.

Plot No.	Nature of object-lesson or demonstration.	Name of crop.		Remarks.
		Rabi.	*Bhadai.*	
1	2	3	4	5
1	Tillage-ploughing ...	Wheat ...	Maize ...	Ploughed, prepared and sown in the ordinary way.
2	No tillage, no ploughing.	Do. ...	Do. ...	Not ploughed, but seeds dibbled in small holes made by *khurpi*.
3	Frequent cultivation	Do. ...	Do. ...	Weeds kept down by frequent hoeing.
4	Not frequent cultivation.	Do. ...	Do. ...	Weeds allowed to grow.
5	Early sowings ...	Do. ...	Do. ...	.....
6	Late sowings ...	Do. ...	Do. ...	About a month late than plot No. 5.
7	Broad-casting ...	Do. ...	Do. ...	.....
8	Dibbling ...	Do. ...	Do. ...	The seeds were dibbled in plough furrows.
9	Drilling ...	Do. ...	Do. ...	Drilling done by the country plough seed-drill.
10	Good and bad seeds...	Do. ...	Do. ...	.....
11	Cattle manure ...	Do. ...	Do. ...	.....
12	No manure ...	Do. ...	Do. ...	.....
13	Green manure ...	Do. ...	*Dhaincha* ...	.....
14	Fertilizers ...	Do. ...	Maize ...	Fertilizers used. Ammonia sulphate, potash sulphate, superphosphate and lime.
15	Irrigation ...	Do. ...	Do. ...	*Note.*—The varieties of wheat and maize used in plots Nos. 1 to 16 are Pusa No. 12 and Jaunpur.
16	Water-logging ...	Do. ...	Do. ...	.....
17	Economic crop cereals	Hard grey wheat Soft white „ „ red „ Muzaffarnagar „ Pusa No. 12 „	Central Provinces *aus* paddy. Jonga *aus* paddy Kheria *aus* „ Sathi „ „	.....

TABLE No. III.—*contd.*

Object-Lesson Plots—*contd.*

Plot No.	Nature of object-lesson or demonstration.	Name of Crop.		Remarks.
		Rabi.	*Bhadai.*	
1	2	3	4	5
18	Economic Crop Cereals.	Punjab Barley Sultanpur „ Ballia „ Azamgarh „ Partabgarh „ Local „ White huskless Barley. Red huskless Barley.	Jaunpur Maize Cook's prolific Maize. U. P. hybrid Maize. Ballia Maize. Dhudia „ Knonia „ Foos foosia „ Lalka „ Red striped „	The five last-named varieties of maize are local.
19	Economic Crop Cereals.	Kasmera Barley Murley „ Black Oats Dumraon „ Local „	Local Juar ... U. P. No. A 4 Juar „ „ B 3 „ „ „ B 4 „ „ „ C 1 „ „ „ A 1 „ „ „ B 6 „ „ „ C 2 „ „ „ A 6 „ „ „ B 1 „ „ „ 5 1½ „ „ „ mixed„	The U. P. Juars are all select strains.
20	Economic Crop Cereal millets.	Cheena Local maize Jaunpur Maize. American „	Saran Juar Nandyal „ Gidgup „ Nilwa „ Perio „ Fulgar yellow Juar. Broom corn Juar. Maldandi „ Sundhia „ Gudghi „ Jufine „ Utavali „	Excepting the first one the rest of the Juars are all Bombay varieties.
21	Economic Crop Cereal millets.	Wheat Pusa Nos. 6, 7, 8, 12, 110 and local	Cheena Marua Yellow Kuoni Red „ Black „ Kheri No. 1 Kheri No. 2	During the *Rabi* Season individual heads of different varieties of wheat were sown to show plant individually.
22	Economic Crop Cereal millets.	Under Aghani pulses.	Kodo Black Gondhi Yellow „ Bajra No. 1 Bajra No. 2 Bajra No. 3	Aghani pulses, cowpeas, beans, velvet bean, Soybeans.

TABLE No. III—*contd.*

Object-Lesson Plots—*contd.*

Plot No.	Nature of object-lesson or demonstration.	Name of crop.		Remarks.
		Rabi.	*Bhadai.*	
1	2	3	4	5
23	Economic Crop, pulses	7 Varieties of Aghani Rahar.	Bhadai Kalai. Tinpakhia Kalai. Kala mung. Hara „ Sona „ Meth. Bhiringi. Green Soybean. White „ Yellow „ Black „	
24	Ditto ditto ...	Under previous season's oil-seed crops.	United Provinces Guar. Bombay Guar. Small cowpea. Large „ Green Sim. White „ Red-bordered Sim- Velvet bean. Tetragonal bean. Deshi Rahar. Saran „	
25	Ditto ditto ...	Kusi pea. Kadwa pea. Dabli pea. Early white. Late white. Kabul gram Patna „ Local „	Aghani Rahar, white. Aghani Rahar, black. Aghani Rahar, spotted. Aghani Rahar, black-tipped. Aghani Rahar, red. Aghani Rahar, greenish.	
26	Economic Crop — Pulses and Fibres ...	Masur Deshi Khesari Purbi „	Cotton No. 1. „ „ 2. „ „ 3. Sirajgunge jute. Deshi jute. Dhaincha.	
27	Economic Crop — Oil-seeds and fibres.	Raipur Rai. Jabbalpur Rai. Local Rai. Purbi (sarson). Maghi Gota.	Bhâdaî Kudrum. Pusa Kudrum. Deshi Kudrum. Deshi Sanhemp. Parbaria Sanhemp.	
28	Economic Crop — Oil-seeds.	Til. Poppy. Sarguja. Safflower. Linseed.	Ground nut. Til. Seven varieties of castor.	

TABLE No. III.—*contd.*

Object-Lesson Plots—*contd.*

Plot No.	Nature of object-lesson or demonstration.	Name of crop.		Remarks.
		Rabi.	*Bhadai.*	
1	2	3	4	5
29	Plant individuality or heredity.	Castor ...	Maize and Kaoni	Lines from individual cobs of maize and heads of kaoni were sown.
30	Green manuring crops	...	Dhaincha Sunhemp Cowpea Bean Soy bean. Meth. Kalai. Jute. Shama grass.	
31	Fodder crops ...	Kurthi. Peas. Soybean. Khesari. Oat and pea. Oat. Guinea grass. Sugarcane.	Meth. Mahysam kalai. Kalai. Soybean. Cowpeas. Sim Juar. Reana. Sunhemp. Guinea grass. Sugarcane.	
32 & 33	Rotational ...	Wheat and gram	Maize and Kalai	Systems of rotation, cereal after cereal, iereal after legrum, cegrum after legrum.
34 to 36	Crop mixtures ...	Barley and Gram Ditto pea. Linseed and Gram „ and Masur and Gram. Gram and Masur and Linseed and Rai. Gota and Gram and Safflower. Safflower and gota Wheat and Rai and Purbi. Wheat and Gram and Rai. Pea and Rai.	Juar and Rahar and Til. Rahar and Kalai. Maize and Kudram and Kaoni. Maize and Kheri. Maize and Kheri and Kaoni. Juar and Meth. Maize and Rahar. Maize and San and Rahar.	
37	Spices	Onion. Garlic. Coriandar. Ajwan. Jixa. Aniseed. Methi.		

TABLE No. III.—*concld.*

Object Lesson Plots—*concld.*

Plot No.	Nature of object-lesson or demonstration.	Name of crop.		Remarks.
		Rabi.	*Bhadai.*	
1	2	3	4	5
38 to 40	Grasses ...	...	Dubri, Parhar. Garar (red) Gurar. (Green) Ghegha. Banmarab, Mouna. Bosiun, Bhosi (large). Bhosi (small) Fulghas. Banri, kharsams. Makra, Katari, Khar. Deblaghar, Rarh, Kus, Kasal, Sama. Bhonjuar, Latra. Ormo, Fulko, Chousia. Jungli Cheena. Sabai.	

TABLE No. IV.

Composition of soils of the Sabour Farm.

Serial No.	Reference number of Block.	Number of soil samples taken for analysis.	Essential soil constituents. Range in variation. From maximum. P_2O_5 %	From maximum. K_2O %	From maximum. N %	To maximum. P_2O_5 %	To maximum. K_2O %	To maximum. N %	Average percentage. P_2O_5 %	Average percentage. K_2O %	Average percentage. N %	Remarks.
1	2	3	4	5	6	7	8	9	10	11	12	13
1	A ...	16 ...	·047	·023	·090	·026	·018	·050	·035	·020	·067	
2	B	16 ...	·037	·027	·070	·005	·014	·045	·017	·08	·057	
3	C ...	12 ...	·014	·034	·065	·009	·023	·047	·011	·029	·057	
4	I ...	27 ...	·039	·023	·081	·021	·006	·046	·028	·012	·059	
5	J ...	19 ...	·019	·014	·058	·013	·008	·049	·016	·012	·055	
6	K ...	70 ...	·013	·017	·095	·008	·007	·052	·011	·011	·070	
7	Orchard	3 ...	·024	·010	·062	·016	·007	·040	·019	·009	·054	
8	L ...	54 ...	·126	·061	·007	·026	·007	·069	·084	·029	·084	

TABLE No. V.

Statement showing distribution of rainfall at Sabour from 1st July 1916 to 30th June 1917.

Months.	Rainfall during 1916-17.			Number of rainy days during 1916-17.			Heaviest in 24 hours.		Average for the last 9 years.	
	Fortnightly distribution.	Amount.	Total.	Fortnightly distribution.	Number of days.	Total.	Amount.	Date.	Rainfall.	Number of rainy days.
1	2	3	4	5	6	7	8	9	10	11
July 1916 ...	1st Fortnight ...	3·54	9·79	1st Fortnight ...	6 days	18 days	2·28	8th July 1916 ...	10·21	19·08
	2nd ,, ...	6·25		2nd ,, ...	12 ,,					
August ,, ...	1st ,, ...	7·82	11·24	1st ,, ...	8 ,,	15 ,,	2·59	12th August ,, ...	10·35	29·108
	2nd ,, ...	3·42		2nd ,, ...	7 ,,					
September ,, ...	1st ,, ...	3·00	6·59	1st ,, ...	4 ,,	11 ,,	1·71	23rd September ,, ...	5·49	10·991
	2nd ,, ...	3·59		2nd ,, ...	7 ,,					
October ,, ...	1st ,, ...	6·17	9·42	1st ,, ...	7 ,,	13 ,,	2·26	5th October ,, ...	2·47	3·754
	2nd ,, ...	3·25		2nd ,, ...	6 ,,					
November ,, ...	1st ,, ...	Nil	Nil	1st ,, ...	Nil	Nil	Nil	.....	0·91	1·375
	2nd ,, ...	Nil		2nd ,, ...	Nil					
December ,, ...	1st ,, ...	Nil	Nil	1st ,, ...	Nil	Nil	Nil	.....	0·25	0·250
	2nd ,, ...	Nil		2nd ,, ...	Nil					
January 1917 ...	1st ,, ...	Nil	Nil	1st ,, ...	Nil	Nil	Nil	.....	0·15	0·375
	2nd ,, ...	Nil		2nd ,, ...	Nil					
February ,, ...	1st ,, ...	0·38	0·38	1st ,, ...	1 day ...	1 day	0·38	5th February 1917 ...	0·75	2·159
	2nd ,, ...	Nil		2nd ,, ...	Nil					
March ,, ...	1st ,, ...	0·02	0·26	1st ,, ...	1 day ...	3 days	0·20	21st March ,, ...	0·55	2·221
	2nd ,, ...	2·04		2nd ,, ...	2 days ...					
April ,, ...	1st ,, ...	Nil	Nil	1st ,, ...	Nil	Nil	...	.....	0·79	2·125
	2nd ,, ...	Nil		2nd ,, ...	Nil					
May ,, ...	1st ,, ...	2·11	3·66	1st ,, ...	6 days	11days	0·85	6th May 1917 ...	2·83	6·971
	2nd ,, ...	1·55		2nd ,, ...	5 ,,					
June ,, ...	1st ,, ...	3·29	5·69	1st ,, ...	4 ,,	10 ,,	1·95	1st June ,, ...	10·88	15·708
	2nd ,, ...	2·40		2nd ,, ...	6 ,,					

TABLE No. VI.

Statement showing the quantity of seed indented and quantity supplied from the Sabour Farm during 1916-17.

Serial No.	Name of seds indented.	Quantity indented.	Quantity supplied.	Remarks.
1	2	3	4	5
		lbs. oz.	lbs. oz.	
1	Barley (local)	1,145 12	1,145 12	Out of this 890 lbs. supplied from outside purchase.
2	,, (murby)	112 12	112 12	
3	Cassava cuttings	620 cuttings	620 cuttings	Supplied from Economic Botanist section.
4	Cowpea	560 ...	... ...	
5	Cotton seed	5 ...	... ...	
6	Carrot seed	... ...	... ...	0—8—0

TABLE No. VI—*contd.*

Statement showing the quantity of seed indented and quantity supplied from the Sabour Farm during 1916-17—*contd.*

Serial No.	Name of seeds indented.	Quantity indented.		Quantity supplied.		Remarks.
1	2	3		4		5
		lbs.	oz.	lbs.	oz.	
7	Dhaincha	274	...	194	...	
8	Florida bean	12	...	12	...	Supplied from Economic Botanist section.
9	Gram (local)	486	...	486	...	
10	„ (Cabul)	47	...	47	...	
11	„ (Patna)	160	...	160	...	
12	Juar (local)	64	...	64	...	24 lbs. seeds supplied from outside purchase.
13	Khesari (local)	1	4	1	4	
14	Maize (Jaunpur)	896	8	518	8	
15	Mustard maghi	134	...	134	...	
16	Oats (Dumraon)	160	...	160	...	
17	Paddy (Benibhog)	20	...	...	...	
18	„ (C. P. aus)	315	12	315	12	
19	„ (Dhahia)	204	12	204	12	
20	„ (Hemcha)	360	...	123	...	
21	„ (Kajarghore) ...	697	...	697	...	
22	„ (Kalamdan) ...	780	...	780	...	
23	Peas (local)	160	...	160	...	
24	„ (Patna)	3	12	3	12	
25	Potato	100	...	...	...	
26	Rahar (local)	10	8	10	8	
27	Rahar (Saran)	12	0	12	0	
28	Raddish seed	1	0	...		
29	Sunhemp seed	60	0	Nil.		
30	Safflower seed	80	0	80	0	Supplied from outside purchase.
31	Soybean	20	0	20	0	Supplied from Economic Botanist's section.
32	Sugarcane cuttings	2,166	0	326	0	
33	Tobacco seed	0	1	...		
34	„ Local	0	¼	0	¼	
35	„ Pusa No. 28 ...	0	½	0	½	
36	Wheat Pusa No. 2	80	0	...		
37	„ „ „ 6	36	8	36	8	
38	„ „ „ 7	16	0	16	0	
39	„ „ „ 8	64	0	64	0	
40	„ „ „ 12	21,844	10	21,524	10	
41	„ „ „ 106 ...	16	0	16	0	
42	„ „ „ 110 ...	16	0	16	0	
43	„ „ „ local ...	44	12	44	12	
44	„ „ „ White ...	160	0	160	0	Supplied from outside purchase.
45	„ „ „ Red ...	2,800	0	2,800	0	Supplied from outside purchase.
46	Paddy seedlings	6,805	sft	6,805	sft.	

TABLE No. VII.

Showing the laying out work done on the Sabour Farm during 1916-17.

Serial No.	Work done.	Object.	Amount paid to labourers.	Estimated cost of materials.	Total cost.	Remarks.
1	2	3	4	5	6	7
			Rs. a. p.	Rs. a. p.	Rs. a. p.	
1	Construction of a drain on the east of cattle-shed.	To improve the sanitation of the cattle-shed.	50 5 9	71 14 0	122 3 9	Rs. 24 more included for bricks, brick-bats and surkhi supplied from the Farm.
2	Construction of a *Thak*.	To store grain experimentally.	22 1 4	41 14 0	63 15 4	Rs. 8 more included for bricks and surkhi supplied from the Farm.
3	Renewing the roof of the horticulture house and refixing wire netting.	To start experiments in horticulture house.	21 4 0	43 13 0	65 1 0	Rs. 27 more included for bamboo Tal wood and Naria tiles supplied from the Farm.

TABLE No. VIII.

Statement of live-stock for the year ending 30th June 1917.

Bullocks, Sonepur (old).	Bullocks, Sonepur (new).	Bullocks, Barahpur (new).	Bullocks, Montgomery.	Bulls, Montgomery.	Cows, Montgomery.	Cow Calves, Montgomery.	Bull Calves, Montgomery.	Buffaloes.	Remarks.
1	2	3	4	5	6	7	8	9	10
5	36	8	7	4	10	14	12	6	

TABLE No. IX.

Increase of Herd since 1910-11.

Year.	Bulls.	Cows.	Bull calf.	Cow calves.	Bullocks.	Total.	Remarks.
1	2	3	4	5	6	7	8
1910-11 ...	1	11	3	3	Nil	18	
1911-12 ...	1	11	5	10	2	29	
1912-13 ...	1	13	9	12	2	37	
1913-14 ...	2	14	15	11	3	45	
1914-15 ...	2	18	14	14	5	53	
1915-16 ...	4	20	15	20	7	66	
1916-17 ...	3	19	17	25	7	71	

NOTE.—This statement excludes all losses.

TABLE No. X.

Yield of milk and Profit and Loss Statement.

Serial No.	Name and No. of Cow.	Date of birth.	Date of calving.	Total No. of days milked.	Total No. of days dry.	Yield of milk.	Value of milk.	Cost of feeding.	Profit.
1	2	3	4	5	6	7	8	9	10
						lbs. oz.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1	Singhi 18 P ...	Unknown	23-1-1916	238	141	2,269 12	113 7 9	43 0 0	70 7 9
2	Lalia 71 P ...	31-12-1907	13-3-1916	269	139	2,029 5	101 7 6	37 7 0	64 0 6
3	Ganga 16 S ...	26-5-1912	25-2-1916	293	125	3,300 11	165 0 6	39 4 0	125 12 6
4	Thandi 14 P ...	29-3-1904	21-8-1915	276	171	2,578 8	128 14 9	54 6 0	74 8 9
5	Gomoni 48 P ...	17-2-1907	13-9-1915	290	91	3,379 8	168 15 8	51 0 0	117 15 8
6	Bhagabatu ...	7-12-1911	27-2-1915	245	145	2,552 4	127 9 9	49 4 0	78 5 9

TABLE No. XI.

Detail of milk yield of cows.

No.	Name.	Age.	Total number of years under observation.	Total No. of days in milk.	Total No. of days dry.	Average of maximum daily yield.	Average daily yield.	Yearly average output of milk.	Yield of milk in the year 1916-17.	Value of milk during the period as shown in column 4.
1	2	3	4	5	6	7	8	9	10	11
					ozs.	Lbs oz.	Lbs. oz.	Lbs. oz.	Lbs. oz.	Rs. a. p.
1	Thandi	13 3 5	5½	1,454	702	9 15	8 4	2,070 0	2,578 8	621 0 3
2	Singhi	Unknown	5½	1,175	1,074	12 1	10 6	2,466 11	2,269 12	621 10 9
3	Gomoni	10 4 12	5½	1,560	546	11 8	8 13	2,477 0	3,379 8	743 1 9
4	Lalia	9 6 1	4½	1,242	690	8 7	7 13	1924 11	2,029 5	481 2 10
5	Bhagabatu ...	4 6 25	1½	591	245	10 6	10 0	2,900 7	2,552 4	290 0 9
6	Ganga	5 1 0	1½	293	125	11 4	11 4	3,300 11	3,300 11	165 0 0

TABLE No. XII.

Table showing number of cattle distributed from the Sabour Dairy to the public during the year ending 30th June 1917.

Serial No.	Name of Cattle.	Brand number.	Price.	To whom supplied.
1	2	3	4	5
			Rs.	
1	Kabai	4 S	60	Babu Monmohan Thakur, Barari, Bhagalpur.
2	Belu	60 S	20	Ditto ditto.
3	Bijli	98 P	30	Babu Bhuban Mohan Lahiri, Bhagalpur.
4	Asha	62 S	15	Ditto ditto.
5	Krishna	37 S	150	F. A. Savi, Esq., : Bhagalpur.

Annual Report of the Bankipore Agricultural Station for the year 1916-17.

The Bankipore Agricultural Experimental Station was established in 1906. The farm is situated in latitude 25°-37″ north and longitude 85°-14″ east on land just south of the Bankipore Railway Station of the East Indian Railway and comprises about 210 acres of which about 170 acres are under cultivation, almost the whole being rice land; the remainder is occupied by roads, buildings, orchard, etc.

The soil is a heavy, almost black, clay. The following table gives the chemical analysis of the soil made by Mr. Taylor, the Agricultural Chemist to the Government of Bihar and Orissa :—

Particulars.	North of Distributary.		South of Distributary.	
	Surface soil per cent.	Sub-soil per cent.	Surface soil per cent.	Sub-soil per cent.
1	2	3	4	5
Insoluble matter	76·96	73·84	75·60	73·85
Potash	·82	·82	·80	·83
Soda	·82	·82	·50	·52
Lime	1·89	1·65	·82	1·32
Magnesia	1·38	1·96	·73	1·17
Iron Aluminium	14·46	17·06	17·24	18·32
Phosphorus Pentoxide	·25	·30	·17	·13
Sulphur Trioxide	Trace ...	Trace ...	Trace ...	Trace.
Carbon Dioxide	Trace ...	Trace ...	Trace ...	Trace.
Combined moisture and organic matter* ...	3·42	3·55	4·23	3·36
Total ...	100·00	100·00	100·09	100·00
* Containing nitrogen	·97 per cent	·955 per cent	·965 per cent	·943 per cent

The farm is irrigated by the Patna Distributary of the Khagole Branch of the Sone Canals.

The total cost of the farm for the Financial year from 1st April to 31st March 1917, was Rs. 10,626-7-5 and the total amount deposited into the treasury during the year was Rs. 7,318-1-1.

Certain deductions may be made from this total in order to arrive at the approximate cost of the cultivation and upkeep of the station. These are detailed below :—

	Rs.	a.	p.	Rs.	a.	p.
Total cost of the experimental station for the year 1916-17				10,626	7	5
Deduct—						
1. Pay and travelling allowance of Superintendent, Overseers and Office.	2,305	7	6			
2. Postage and telegram charges, furniture office expenses, hot-weather charges and Municipal Tax.	74	6	0			
3. Laying out	456	12	1			
4. Cost of bullocks and implements	680	11	0			
5. Branding charges of bullocks	25	0	0			
6. Cost of construction of one cart-shed	246	13	3			
				3,789	1	10
Total				6,837	5	7

	Rs.	a.	p.
Total paid into the Treasury during the year 1916-17 ...	7,318	1	1

Deduct—

	Rs.	a.	p.			
Stock in hand on 1st April 1916	1,319	14	9			
Bills due on 1st April 1916	241	0	0			
Total	1,560	14	9			
Add—						
Stock in hand on March 31st, 1917	2,282	2	1			
Bills due on March 31st, 1917	203	13	11			
Total	2,486	0	0			
				925	1	3
Total				8,243	2	4

If the above calculations are allowed a profit is shown of Rs. 1,405-12-9 as against a loss of Rs. 4,546-10-8 during the year 1915-16.

Character of the Season.

The following table gives the number of days on which rain fell and the total rainfall in inches, for each month during the year, together with the average for nine years :—

Month.	1916-17		Average for nine years.
	Number of rainy days.	Rainfall, in inches.	Rainfall, in inches.
1916			
April	Nil	Nil	0·30
May	1	0·10	0·96
June	14	12·41	8·98
July	15	5·72	8·74
August	16	16·19	14·04
September	12	10·20	9·03
October	10	4·86	2·49
November	Nil	Nil	0·73
December	Nil	Nil	0·11
1917			
January	1	0·12	0·17
February	2	0·73	0·85
March	Nil	Nil	0·46
Total ...	71	50·33	46·86

The year under report was on the whole favourable to the Paddy Crop except during October when heavy rains did a considerable amount of damage to the *Kartika* paddy which was in flower.

OUTTURN.

The following are comparative statistics of outturn of paddy and *Rabi* respectively for the past three years :—

Year.	Paddy.	*Rabi.*
1914-15	111,356 lbs. ...	72,652 lbs.
1915-16	106,682 „ ...	64,944 „
1916-17	182,696 „ ...	100,204 „

RICE.—*ORYZA SATIVA.*

I.—RESIDUAL EXPERIMENTS.

Series A.

Manures applied in previous year per acre.	Outturn per acre, in pounds.		Profit (+) or loss (−), in rupees per acre.		
	Grain.	Straw.			
	lbs.	lbs.	Rs.	a.	p.
300 lbs. of Basic slag	2,022	3,782	+54	0	7
1,640 lbs. of Lime	1,885	3,137	+50	5	2
1,640 lbs. of Lime + 4,100 lbs. cowdung ...	2,315	4,030	+67	0	1
Unmanured	1,955	3,580	+54	9	9

The experiments were carried out in duplicate on $\frac{1}{5}$th acre plots.

The variety grown was Kalamdan, a local medium paddy. The above manures were applied during the year 1915-16.

RICE.—*ORYZA SATIVA.*

I.—RESIDUAL EXPERIMENTS.

Series B.

Manures applied in previous year per acre.	Outturn per acre, in pounds.		Profit (+) or loss (−), in rupees per acre.		
	Grain.	Straw.			
	lbs.	lbs.	Rs.	a.	p.
820 lbs. of cowdung	2,050	3,842	+61	7	6
4,100 lbs. „	1,575	3,080	+42	6	6
410 lbs. of Castor Cake	1,807	2520	+44	1	7
Green manuring with *Dhaincha* (*Sesbania aculeata*).	1,602	3,300	+44	4	1
Green manuring with *Sanai* (*Crotolaria Juncea*).	1,737	3,465	+48	2	7
164 lbs. of Sulphate of Magnesia ...	2,062	2,317	+55	6	0
164 lbs. of *Kharisalt* (Hide salt) ...	2,315	3,847	+66	2	9
Unmanured	1,605	3,280	+44	4	9

These experiments were carried out in duplicate, on $\frac{1}{5}$th acre plots. The variety transplanted was *Kalamdan*, a local medium rice. The above manures were applied during the year 1915-16.

RICE.—*ORYZA SATIVA.*

I.—Residual Experiments.

Series C.

Manures applied in previous year per acre.	Outturn per acre, in pounds.		Profit (+) or loss (−), in rupees per acre.
	Grain.	Straw.	
	lbs.	lbs.	Rs. a. p.
160 lbs. of ammonium sulphate ...	1,497	1,905	+ 28 0 9
120 „ of superphosphate	817	1,260	+ 5 3 11
100 „ of muriate of potash ...	295	627	− 12 0 1
100 „ of ammonium sulphate + 100 lbs. of muriate of potash.	1,372	1,652	+ 21 10 5
160 „ of ammonium sulphate + 120 lbs. of superphosphate.	1,667	2,090	+ 34 1 10
120 „ of superphosphate + 100 lbs. of muriate of potash.	792	192	+ 5 5 0
Unmanured	205	435	− 16 4 5

The experiments were carried out in duplicate on $\frac{1}{5}$th acre plots. The variety transplanted was *Baitarni*. The above manures were applied during the year 1915-16.

RICE.—*ORYZA SATIVA.*

II.—Variety Experiments.

Variety.	Outturn per acre, in pounds.		Profit (+) or loss (−) in rupees per acre.
	Grain.	Straw.	
	lbs.	lbs.	Rs. a. p.
Baitarni Paddy	2,305	3,386	+65 14 4
Bairanti „	2,201	2,734	+ 4 2 8
Gajpatta „	2,366	2,918	+53 6 1
Kartika * „	1,590	3,396	+50 15 5
Laldaya „	1,805	2,644	+33 10 4
Shamjira „	1,642	3,081	+35 9 8
Selha „	2,253	3,264	+53 12 4
Sirhanti „	2,217	3,049	+49 8 4

All the above are *Aghani* Paddy except *Kartika* * which is cut in October or November. *Baitarni* is a fairly coarse paddy, Laldaya a medium, Bairanti, Gajpatta, Selha and Sirhanti are coarse varieties. These experiments were carried out in triplicate, on $\frac{1}{4}$th acre plots. All the above plots were manured with cowdung at the rate of 4,100 lbs. to the acre.

RICE.—*ORYZA SATIVA.*

III.—Seedlings Experiments.

Series A.

Method of transplanting.	Outturn per acre, in pounds.		Profit (+) or loss (—), in rupees per acre.
	Grain.	Straw.	
1	2	3	4
	lbs.	lbs.	Rs. a. p.
2 Seedings per hole	1,676	2,492	+25 4 6
4 do. „	1,829	2,589	+25 7 0
8 do. „	1,898	2,897	+26 14 8

The experiments were carried out, in triplicate, the plots were of the $\frac{1}{4}$th acre each. The variety transplanted was Sirhanti. The above plots were manured with cowdung at the rate of 4,100 lbs. to the acre.

RICE.—*ORYZA SATIVA.*

III.—Seedling Experiments.

Series B.

Method of transplanting.	Outturn per acre, in pounds.			
	410 lbs. of seed per acre of seed-bed.		615 lbs. of seed per acre of seed-bed.	
	Grain.	Straw.	Grain.	Straw.
1	2	3	4	5
	lbs.	lbs.	lbs.	lbs.
2 Seedlings per hole ...	340	648	600	736
4 do. „ ...	732	756	556	728
8 do. „ ...	424	736	748	1,080

The above results relate to a series of experiments conducted in order to ascertain the relative merits of sowing less seed in the seed-bed, and transplanting less seedlings in the field, as compared with the practice of local cultivators. Seedlings for transplanting were obtained from a local cultivator living in the vicinity of the Farm and both Farm seedlings and those of the cultivator's were uprooted and transplanted on the same day.

The Farm seeds in the seed-bed were sown at the rate of 410 lbs. per acre on the same day as the cultivator put down his seeds at the rate of 615 lbs. to the acre. The experiments were carried out on single plots of $\frac{1}{4}$th acre and transplanted with Baitarni.

RICE.—*ORYZA SATIVA.*

IV.—CULTIVATION EXPERIMENTS.

Series A.

In accordance with the general practice of this district of broadcasting a leguminous *Rabi* crop (*Paira* crop) in standing paddy, a series of experiments were again conducted this year for finding out whether the rice and *Paira* crops are affected by hot-weather cultivation and if so, to what extent.

Treatment of the land.	Outturn per acre, in pounds.		Profit (+) or (—) loss per acre.
	Grain.	Straw.	
	lbs.	lbs.	Rs. a. p.
Ploughed with Punjab plough ...	470	1,230	—5 14 2
Ploughed with Desi plough ...	1,210	1,880	+19 9 4
Unploughed	720	1,430	+ 4 2 8
Ploughed with Hindustan plough ...	230	700	—11 14 10

These experiments were carried out on $\frac{1}{10}$th acre plots, the variety transplanted was *Kalamdan*. The plot under this experiment was under water for several days after transplantation.

The following table shows the result of grain broadcasted in the same plots:—

Treatment of the land before the rice crop.	Outturn per acre, in pounds.		Profit (+) or loss (—) per acre in rupee.
	Grain.	Straw.	
	lbs.	lbs.	Rs. a. p.
Ploughed with the Punjab plough ...	1,000	800	+29 12 8
Ploughed with Desi plough ...	1,310	1,230	+44 6 10
Unploughed ...	840	750	+23 12 10
Ploughed with Hindustan plough ...	840	780	+23 12 10

RICE—*ORYZA SATIVA.*

IV.—CULTIVATIONEXPERIMENTS.

Series B.

Treatment of the land.	Outturn per acre, in pounds.		Profit (+) or loss (—) per acre in rupees.
	Grain.	Straw.	
	lbs.	lbs.	Rs. a. p.
Ploughed with Punjab plough in hot weather and green manuring with *Sanai* (*Crotolaria juncea*).	1,355	1,770	+18 5 4
Unploughed in hot weather and green manuring with *Sanai* (*Crotolaria juncea*)	780	1,455	+2 7 7
Unploughed in hot weather and green manuring with *Sanai* (*Crotolaria juncea*); plus 32 lbs. *Khari* salt as top dressing.	1,845	2,725	+37 5 6
Ploughed with Punjab plough in hot weather and green manuring with *Sanai* (*Crotolaria juncea*) plus 32 lbs. *Khari* salt as top dressing.	1,615	2,395	+25 1 3

These experiments were carried out on $\frac{1}{5}$th acre plots. The variety transplanted was *Kulamdan*, a local medium paddy.

The following table shows the result of grain broadcasted in the same plots. The experiments were carried out on $\frac{1}{5}$th acre plots. The results have been shown per acre :—

Treatment of the land before the rice crop.	Outturn per acre, in pounds.		Profit (+) or loss (—) per acre in rupees.
	Grain.	Straw.	
	lbs.	lbs.	Rs. a. p.
Ploughed with Punjab plough in hot weather plus green manure with *Sanai* (*Crotolaria juncea*).	855	825	+27 0 1
Unploughed in hot weather and green manure with *Sanai* (*Crotolaria juncea*) plus 32 lbs. *Khari* salt as top dressing.	885	855	+28 2 10
Unploughed in hot weather plus green manure with *Sanai* (*Crotolaria juncea*).	635	620	+17 12 7
Ploughed with Punjab plough in hot weather plus green manure with *Sanai* (*Crotolaria juncea*) plus 32 lbs. *Khari* salt as top dressing.	1,340	1,250	+47 0 11

RICE—*ORYZA SATIVA.*

IV.—CULTIVATION EXPERIMENTS.

Series C.

These experiments were carried out on $\frac{1}{4}$th acre plots ; two of these were in triplicate, four in duplicate and two in single plots. The variety transplanted was *Bartarni.*

Treatment of the land.	Outturn per acre, in pounds.		Profit (+) or loss (—) per acre in rupees.
	Grain.	Straw.	
	lbs.	lbs.	Rs. a. p.
Dug out in hot weather and green-manured with *Dhaincha (Sesbania aculeata)* (single).	2,136	2,760	+12 4 0
No hot weather treatment but green-manured with *Dhaincha (Sesbania aculeata)* (duplicate).	2,144	2,768	+52 6 8
Dug out in hot weather, green-manured with *Dhaincha (Sesbania aculeata)* plus 164 lbs. *Khari* salt per acre as top dressing (duplicate).	2,476	2,904	+54 6 8
No hot weather treatment but green-manured with *Dhaincha* (*Sesbania aculeata*) plus 164 lbs. *Khari* salt per acre as top dressing (single).	2,552	3,548	+28 2 8
No hot weather treatment but 164 lbs. *Khari* salt as top dressing per acre (triplicate).	2,548	3,232	+24 1 0
Dug out in hot weather (triplicate) ...	2,115	2,626	+16 14 10
Dug out in hot weather plus 164 lb. Khari salt per acre as top dressing (duplicate).	2,272	2,994	+18 8 6
No hot weather treatment (duplicate) ...	1,978	2,374	+49 10 2

The following table shows the result of gram broadcasted in the same plots. The experiments were carried out on ¼th acre plots :—

Treatment of land before the rice crop.	Outturn per acre, in pounds.		Profit (+) or loss (—), per acre, in rupees.
	Grain.	Straw.	
	lbs.	lbs.	Rs. a. p.
Dug out in hot weather and green-manured with *Dhaincha* (*Sesbania aculeata*) (single).	624	548	+20 2 0
No hot weather treatment but green-manured with *Dhaincha (Sesbania aculeata)* (duplicate).	508	428	+15 2 6
Dugo ut in hot weather and green-manured with *Dhaincha* (*Sesbania aculeata*) plus 164 lbs. *Khari* acre as top dressing (duplicate).	600	524	+18 15 6
No hot weather treatment but green-manured with *Dhaincha* (*Sesbania aculeata*) plus 64 lbs. *Khari* salt per acre as top dressing (single).	420	304	+8 7 4
No hot weather treatment but 164 lbs. *Khari* salt per acre as top dressing (triplicate).	484	400	+14 1 1
Dug out in hot weather (triplicate)	513	433	+14 14 4
Dug out in hot weather plus 164 lbs. *Khari* salt per acre as top dressing (duplicate).	536	432	+15 14 10
No hot weather treatment (duplicate) ...	538	440	+16 1 6

RICE—*ORYZA SATIVA.*

IV.—Cultivation experiments.

Series D.

The following table shows the result of experiments. These experiments were carried out in ⅕th acre plots. Only manured plots were in triplicate, while others were single. The *Baitarni* paddy was broadcasted in the third week of June :—

Treatment of land.	Outturn per acre, in pounds.		Profit (+) or loss (—), per acre, in rupees.
	Grain.	Straw.	
	lbs.	lbs.	Rs. a. p.
Dug out in hot weather	795	1,035	—16 15 3
Unmanured	755	935	+12 8 10
32 lbs. common salt applied as top dressing.	1,035	1,530	+14 1 5
Unmanured	935	1,380	+17 2 5
32 lbs. Magnesium sulphate applied as top dressing.	1,120	1,765	+ 1 1 6
32 lbs. *Khari* salt as top dressing ...	1,380	1,825	+28 4 11
Unmanured	825	1,205	+14 0 2

The following Table shows the result of gram broadcasted in the same plots. The manures were applied on paddy crop :—

Treatment of land.	Outturn per acre in pounds.		Profit (+) or loss (—) per acre, in rupees.
	Grain.	Straw.	
	lbs.	lbs.	Rs. a. p.
Dug out in hot weather	700	670	21 10 3
Unmanured	840	765	27 2 2
32lbs. of common salt applied as top dressing	670	550	19 4 4
Unmanured	830	820	22 5 11
32 lbs. Magnesium sulphate applied as top dressing.	665	535	3 12 8
32 lbs. *Khari* salt applied as top dressing	545	455	13 7 0
Unmanured	660	555	19 0 7

Classification of charges under experimental and non-experimental works carried out on the Bankipore Farm during the year 1916-17 :—

Experimental area (21·90 acres).	Amount.	Non-experimental area (148·03 acres).
	Rs. a. p.	Rs. a. p.
Seeds	18 7 3	95 2 0
Manures	54 10 3	91 15 0
Labour	918 8 0	4,257 15 11
Feed of cattle	45 12 3	454 10 0
Maintenance and miscellaneous	35 2 3	317 9 0
Total Rs. ...	1,072 8 0	5,217 3 11
Receipts „ ...	1,722 3 8	9,010 14 3
Profit ...	+649 11 8	+3,793 10 4
Total profit ...	.....	+4,443 6 0

N. B.—In calculating the profit of Experimental and Non-experimental works carried out on the Farm, the value of (straw, etc.) bye-products as existing at the time of storage has also been included.

Statement showing receipts and expenditure of the Bankipore Farm for the year ending 30th June 1917.

Receipts.				Expenditure.					
Particulars.	Amount.			Particulars.	Amount.			Total.		
	Rs.	a.	p.		Rs.	a.	p.	Rs.	a.	p.
1. Sale-Proceeds of Farm produce.	6,165	14	6	I.—Non-recurring contingent expenditure.						
2. Miscellaneous receipts	140	15	3	1. Purchase of cattle ...	499	4	0			
3. Sale of old stores ...	41	0	0	2. Purchase of implements	46	5	0			
4. Value of produce in hand on 30th June 1917.	2,261	3	4	3. Petty construction and repairs.	246	13	3			
5. Amounts of bills outstanding on 30th June 1917.	144	12	3	4. Railway and steamer freight.	14	7	0			
				5. Laying out ...	386	8	9	1,193	6	0
Gross receipts ...	8,753	13	4	II.—Recurring contingent expenditure.						
				(a) *Office expenses.*						
Deduct—										
Value of the stock in hand on 30th June 1916. Rs. 758-8-9.				1. Service postage stamps	16	0	0			
				2. Hot weather charges	2	1	6			
				3. Office expenses ...	10	7	0			
Amount of bills outstanding on 30th June 1916. Rs. 186-3-6				4. Municipal Tax ...	8	0	6			
				5. Purchase of furniture	25	15	6			
								62	8	6
Total ...	944	12	3	(b) *Establishment charges*						
Net receipts ...	7,809	1	1	Pay and travelling allowance of Superintendents, Overseers, clerk, office peon and chaukidar.	2,430	4	9	2,430	4	9
				(c) *Cultivation* :—						
				1. Feed of cattle ...	500	6	3			
				2. Purchase of seeds ...	113	9	3			
				3. Purchase of manures	205	2	3			
				4. Wages of labourers...	5,176	7	11			
				5. Miscellaneous contingencies.	352	11	3	6,348	4	11
				Grand Total ...	...			10,034	8	2

After deducting the non-recurring contingent expenditure and recurring office and establishment expenditure, the total amount which can strictly be called cultivation charges is Rs. 6,348-4-11 so a profit of Rs. 1,460-12-2 is shewn.

J. ROBINSON,

Offg. Deputy Director of Agriculture,

Patna Circle, Bankipore.

Annual Report of the Dumraon Agricultural Station for the year 1916-17.

The Dumraon Agricultural Experimental Station, the oldest in the Province, was established in 1895. It is situated in latitude 25°-30″ north on lands lying either side of the railway line just east of Dumraon station, East Indian Railway. The land is provided by the Dumraon Raj, who meet all the expenses of the station.

For ten years previous to the opening of the present Farm the Raj maintained another experimental station about two miles west of Dumraon, but this was abandoned in 1895, when the present site was selected as more suitable by Dr. Leather, the Imperial Agricultural Chemist.

The area of the farm is about 30 acres, of which about 24 acres are under cultivation, the remainder being occupied by roads, buildings, etc. The soil is a light sandy loam resting on a heavier sub-soil. The following table gives the chemical analysis of the first and second nine inches of the soil :—

Particulars.	First 9 inches.	Second 9 inches.
Insoluble silicates and sand	85·63	80·90
Ferric Oxide	3·82	6·12
Alumina	5·52	6·50
Lime	·38	2·07
Magnesia	·83	1·17
Potash	·58	·73
Soda	·64	...
Phosphoric Acid	·04	·08
Sulphuric Acid	·02	...
Carbonic Acid	·08	·05
Organic matter and combined water	2·46	2·38
Total ...	100·00	100·00

The Farm is irrigated from the Bhojpur Distributary of the Sone Canal and there is a well in the northern section which can command a limited area.

The total expenditure in running the Farm during the year amounted to Rs. 3,029-9-10. The amount paid into the treasury during the same period was Rs. 1,083-7-3.

Certain deductions may be made from the above totals in order to arrive at the approximate cost of the cultivation and upkeep of the station.

These are detailed below, no accouut being taken of the expenditure on various miscellaneous items unconnected directly with the maintenance of the Farm.

	Rs.	a.	p.	Rs.	a.	p.
Total cost of the Experimental Station for the year 1916-17.				3,029	9	1
Deduct—						
(1) Pay, pension contribution and travelling allowance of the Superintendent and office.	1,178	13	9			
(2) Postage and Telegraph charges ...	21	8	0			
(3) Office expenses, furniture, etc. ...	163	8	6			
				1,363	14	3
				1,665	10	10

				Rs. a. p.
Total paid into the treasury during the year 1916-17.				1,083 7 3
Deduct—		Rs. a. p.		
(1) Stock in hand on April 1st, 1916	...	624 11 11		
(2) Bills due on April 1st, 1916	...	34 15 0		
Total	...	659 10 11		
Add—				
(1) Stock in hand on March 31st, 1917	...	309 14 10		
(2) Bills due on March 31st, 1917	...	144 3 3		
		454 2 1		
				205 8 10
			Total ...	877 14 5

If the above calculations are allowed, a loss of Rs. 787-12-5 is shown. This compares very unfavourably indeed with last year or any preceding year and is a most unsatisfactory termination to a year's work.

Character of the season.

The following table gives the number of rainy days and the rainfall in inches, for each month :—

Month.	Number of rainy days.	Rainfall, in inches.
April 1916	1	0·06
May ,, ...	2	0·11
June ,, ...	13	7·27
July ,, ...	21	13·09
August ,, ...	23	17·63
September ,, ...	11	6·87
October ,, ...	9	3·14
November ,, ...	Nil	Nil
December ,, ...	Nil	Nil
January 1917	1	0·15
February ,, ...	2	0·58
March ,, ...	1	0·28
Total ...	84	·18

The year, on the whole, was favourable both to the *Kharif* and *Rabi* crop although some damage was done to the standing *Makai* (Zea Mays) on account of heavy rains during August and September.

EXPERIMENTAL WORK ON THE FARM.

RICE—(ORYZA SATIVA).

I.—Manurial Experiments.

The following table gives the results of the manurial experiments on rice :—

Manure applied per acre.	Outturn per acre, in lbs.		Profit (+) or loss (—) in rupees per acre.
	Grain.	Straw.	
	lbs.	lbs.	Rs. a. p.
50 maunds of cowdung	1,742	2,435	+ 20 10 0
Green-manuring, *dhaincha* (*Sesbania aculeata*) ...	1,886	2,502	+ 22 3 10
5 maunds of castor cake	1,993	2,914	+ 13 4 11
Unmanured	1,698	2,726	+ 20 10 0

These experiments were carried out on $\frac{1}{5}$th acre plots, the variety transplanted being *Bansful*—a local medium rice. It is noticeable that although castor cake has given the highest yield both in grain and straw, green-manuring with *Dhaincha* (*Sesbania aculeata*) has proved to be most economical of the three manures employed.

The average yield of the *Pairá* crop following the rice was 163 lbs. to the acre.

MAIZE (*ZEA MAYS*) AND WHEAT (*TRITICUM SATIVUM*).

II.—Cultivation Experiments.

This series of experiments were undertaken with a view to finding out whether it would be more profitable in this district to green-manure the wheat crop as has been recommended over certain tracts, or to manure the land with cow dung at the rate of 100 maunds per acre and to recover two crops, viz., a *Kharif* and a *Rabi*.

Three plots of land, each of one acre, were employed. On the first plot which was unmanured, maize was grown followed by wheat.

On the second plot which had received an application of cow dung at the rate of 100 maunds per acre, two crops, viz., maize and wheat, weretaken.

On the third plot, which had been green-manured with *Sanai* (*Crotolaria juncea*), wheat alone was taken.

The following table gives the results :—

Treatment.	Outturn per acre, in pounds.				Profit (+) or loss (−) in rupees, per acre.
	Maize.		Wheat.		
	Grain.	Straw.	Grain.	Straw.	
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.
No manure	167	1,658	384	759	+ 3 15 9
100 maunds of cowdung per acre ...	154	1,508	573	1,183	+ 9 6 6
Green manure, Sanhemp (*Crotolaria juncea*).	...	...	693	1,434	+ 10 5 10

The maize grown was of the Jaunpur variety, the wheat being Pusa No. 12. All the outturns were poor owing partly to the poorness of land and on account of incessant rains during the months of July and August which retarded the growth of the maize.

Maize (*Zea Mays*) and Wheat (*Triticum Sativum*).

III.—Manurial Experiments.

The following table gives the results of the manurial experiments :—

Treatment.	Outturn per acre, in pounds.				Profit (+) or loss (—) in rupees, per acre.
	Maize.		Wheat.		
	Grain.	Straw.	Grain.	Straw.	
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.
50 maunds of cowdung, 300 lbs. of basic slag.	328	1,537	963	1,886	+37 3 5
100 maunds of lime	...	...	...	...	...
50 maunds of cowdung ...	396	1,640	1,132	2,277	+33 12 5
50 maunds of cowdung ...	433	2,101	1,019	2,082	+64 11 10
Green-manure-Sanhemp (*Crotolaria juncea*) plus 300 lbs. of basic slag.	...	...	1,158	1,798	+34 15 7
Green-manure,Sanhemp (*Crotolaria juncea*)	...	...	1,232	2,481	+57 11 9
Unmanured	205	1,025	589	2,900	+22 12 7

This series of experiment which was carried out on $\frac{1}{5}$th acre plots, was undertaken because it was thought, from the chemical analysis of the soil, that the land might be benefited by the addition of lime. It would appear, that liming is unnecessary, but the results obtained are not definite. It is, however, noticeable that green manure gave the highest outturn of wheat in both the series.

Wheat (*Triticum Sativum*).

IV.—Seedrate Experiment.

The following table gives the results of seedrate experiments :—

Quantity of seed sown per acre.	Outturn per acre, in pounds.		Profit (+) or loss (—) in rupees per acre.
	Grain.	Straw.	
	lbs.	lbs.	Rs. a. p.
80 lbs. per acre	866	1,363	+15 12 1
90 lbs. per acre	714	1,463	+ 5 8 2
100 lbs. per acre	873	1,819	+17 0 4

The experiments were carried out in duplicate on $\frac{1}{5}$th acre plots. The outturns stated above are the average from the two plots calculated per acre.

WHEAT (*TRITICUM SATIVUM*).

V.—Variety Experiments.

The results are given below:—

Variety.	Outturn per acre, in pounds.		Profit (+) or loss (—) in rupees per acre.
	Grain.	Straw.	
	lbs.	lbs.	Rs. a. p.
Pusa wheat No. 12	900	1,866	+17 14 10
Local red wheat	1,024	2,224	+29 13 11

The varieties were grown, in duplicate, on $\frac{1}{5}$th acre plots, the yields given above being the average from the two plots calculated per acre.

SUGARCANE (*SACCHARUM OFFICINARUM*).

VI.—Cultivation Experiments.

Two methods of planting sugarcane were tried this year, viz:—

1. The local system of planting on plough furrows.
2. The trench system. This consists of dividing the land into alternate trenches and ridges, each $2\frac{1}{2}$ feet wide. Cane-sets were planted in double lines 2 feet apart in each trench.

All the plots were manured with 100 maunds of cowdung plus 10 maunds of castor cake per acre.

Two varieties of local sugarcanes were tried in triplicate and the following table gives the average yields of cane, juice and *chakri gur* per acre.

System of planting.	Outturn per acre, in pounds.			Profit (+) or loss (—) in rupees per acre.
	Cane.	Juice.	Gur.	
	lbs.	lbs.	lbs.	Rs. a. p.
Local system	52,643	26,324	2,374	—11 13 9
Trench system	51,592	25,720	2,318	+2 4 3

The crop was badly damaged by white ants and sugarcane borers, hence the low outturns.

Finally, I should not omit to state that the loss of Rs. 787-12-5 which has been shown during the period of the Financial year is due partly to the fact that a considerable area under *Rabi* was harvested, and its produce disposed of, during the Agricultural year. Hence the sale-proceeds have been credited to that period.

Taking the above factor into consideration there would still be a loss of Rs. 315-6-2 which could have been considerably minimized had the Farm Superintendent displayed some energy and exercised sufficient control over his men. He appears to be wanting in both these qualities.

Classification of charges under experimental and non-experimental work during the year ending 30th June 1917.

—	Experimental Area, 8·60 acre.	Non-experimental Area, 15·64.
	Rs. a. p.	Rs. a. p.
Seeds	...	34 12 0
Manure	43 0 0	59 2 3
Labour	146 11 4	293 6 8
Feed of cattle (includes pay of cattle-man) ...	74 9 6	149 3 0
Maintenance (includes repair of implements, petty construction and repairs, rent, rates and taxes).	215 3 8	430 7 4
Miscellaneous	46 3 10	92 7 8
Total ...	+525 12 4	−1,059 6 11
Receipt ...	−620 9 8	+843 7 3
Profit (+) or loss (−) ...	94 13 4	−215 15 8
Total loss ...	...	121 2 4

Statement showing the receipts and expenditure of the Dumraon Farm for the year ending 30th June 1917.

Receipts.	Rs. a. p.	Expenditure.	Rs. a. p.	Total. Rs. a. p.
Sale-proceeds of Farm produce	1,002 0 11	1. Non-recurring contingent expenditure—		
Miscellaneous receipts ...	69 15 7	Purchase of implements	112 7 0	
Value of produce in hand on 30th June 1917.	794 12 7	Railway and steamer freight.	15 4 0	
Amount of bills outstanding on 30th June 1917.	171 4 9	Total ...	127 11 0	127 11 0
Gross receipts ...	2,038 1 10	2. Recurring contingent expenditure—		
Deduct—		(*a*) Office expenses—		
Value of stock in hand on 30th June 1916.	671 3 3	Service Postage Stamps	20 8 0	
Amount of bills outstanding on 30th June 1916.	97 1 6	Office expenses ...	35 6 6	
		Repair of furniture ...	1 11 6	
Total ...	768 4 9	Total ...	57 10 0	57 10 0
Net receipts ...	1,269 13 1	(*b*) Establishment—		
		Pay and Travelling Allowance of Superintendent, Clerk, Peon and Chakidars.	1,196 4 0	1,196 4 0
		(*c*) Cultivation contingent expenditure—		
		Feed of cattle, including pay of cattle-man.	223 12 6	
		Purchase of seeds ...	34 12 0	
		Purchase of manures *...	137 5 3	
		Repair of implements ...	37 1 0	
		Wages for cultivation ...	440 2 0	
		Wages for maintenance	368 6 9	
		Petty construction and repair.	14 4 6	
		Rent, rates and taxes ...	225 14 9	
		Miscellaneous ...	138 11 6	
		Total ...	1,620 6 3	

Receipts.			Expenditure.	Total.	
	Rs.	a. p.		Rs. a. p.	Rs. a. p.
Net Receipt	1,269	13 1	Brought forward ...	1,620 6 3	
			* *Deduct*—Cost of Castor oil cake purchased for the year 1917-18.	35 3 0	
				1,585 3 3	1,585 3 3
			Total Expenditure		2,966 12 3

After deducting the non-recurring contingent expenditure and the recurring office and establishment expenditure, the total amount which can strictly be called "Cultivation charges" is Rs. 1,585-3-3 so a loss of Rs. 315-6-2 is shown.

J. ROBINSON,

The 9th August 1917.

Offg. Deputy Director of Agriculture,
Patna Circle, Bankipore.

Annual Report of the Cuttack Agricultural Station for the year 1916-17.

I. (*a*) *Site.*—The Cuttack Agricultural Experimental Station is situated some six miles from Cuttack town along the Taldanda Road, and in the villages of Bidyadharpur, Kanahipur and Bhadimul. The Farm is irrigated by the Taldanda Canal.

(*b*) *Area.*—The total area of the Farm is 120 acres, while only 84 acres are under actual cultivation. The remaining area is occupied by tanks, buildings, roads and channels. The major portion of the area under cultivation is Rice land.

(*c*) *Brief History.*—The Farm was opened in March 1904 when about 70 acres of land were taken over. This was increased to 120 acres in 1908-9.

II. *Soil.*—The predominant soil of the Farm is a light loam merging into sandy loam and sand in high-lying plots. The following table gives an analysis of the Farm soils :—

Particulars.	Surface soil, first 9 inches per cent.	Sub-soil, second 9 inches per cent.
1	2	3
Insoluble silicates and sand	86·66	84·33
Ferric Oxide	3·74	4·83
Alumina	5·52	·37
Lime	·30	·39
Magnesia	·59	·41
Potash	·24	·33
Soda	·03	·17
Phosphuric Acid	·03	·03
Sulphuric Acid	·01	·007
Carbonic Acid	·05	.06
Organic matter and combined water	2·83	3·07
Total ...	100·00	100·00
Containing Nitrogen	·004	004·

III. *Objects of the Station*:—(*a*) The solution of various problems involved in the cultivation of paddy, the most important crop of this Division.

(*b*) Study of all the varieties of paddy grown in Orissa Division.

(*c*) To ascertain the suitability and methods of cultivation of other important crops, e.g., Sugarcane, Jute, Ground-nuts, Leguminous crops, and cereals.

(*d*) The supply of recommended seeds, manures, and implements to cultivators and others.

(*e*) The demonstration of modern implements of husbandry and improved methods of cultivation.

(*f*) To render every assistance to private individuals, Farms, Co-operative Societies and others in the dissemination of improved methods of Agriculture.

IV. *Season.*—The rainfall during the year under report was not only below normal but also very irregular. Insufficiency of rain during May and very heavy down-pours during June considerably hampered and in some case made it absolutely impossible to broadcast winter rice. Heavy rains during October, November and February did serious damage to paddy crop and partly destroyed the *Rabi* crops.

The season on the whole was very unfavourable. Table below shows the rainfall of the year under report :—

Months.	Average of nine years including 1915-16.	Number of rainy days.	1916-17.
	Rainfall in inches.		Rainfall in inches.
1	2	3	4
April 1916	1·93	2	1·37
May „	2·77	5	1·58
June „	9·43	16	14·51
July „	13·15	12	4·91
August „	14·64	21	15·79
September „	9·01	14	4·62
October „	4·41	18	12·58
November „	1·66	4	3·66
December „	·38	Nil	Nil
January 1917	·24	Nil	Nil
February „	·74	5	5·83
March „	·77	4	·60
Total	59·13	101	65·45

SECTION I.

EXPERIMENTAL WORKS.

A.—Rice.

(*a*) *Manurial Experiments.*

(I) The object of the following experiments was to compare the value of different chemical manures for irrigated transplanted rice. The variety experimented upon was Khura, a local coarse rice, and the tests were carried out in duplicate on $\frac{1}{5}$th acre plots. The manures did not pay for themselves and owing to the very high prices of Potassic manures, it is proposed to

discontinue these tests in the coming season. The following table gives the average results of these tests :—

Manure per acre.	Outturn in pounds. per acre. 1916-17. Grain.	Straw	Cost of cultivation per acre.	Value of yield per acre.	Profit.	Remarks.
			Rs. a. p.	Rs. a. p.	Rs. a. p.	
Sulphate of Ammonia ... 160 lbs. Superphosphate ... ... 120 lbs. Muriate of Potash ... ... 100 lbs.	1,837	3,946	62 2 0	61 0 10	1 1 2	Loss.
Muriate of Potash ... ... 100 lbs. Sulphate of Ammonia ... 160 lbs.	2,024	3,450	56 12 1	64 8 9	7 12 8	
Superphosphate ... ... 120 lbs Sulphate of Ammonia ... 160 lbs.	1,919	3,125	48 4 11	60 11 2	12 6 7	
Superphosphate ... ... 120 lbs. Muriate of Potash ... ... 100 lbs.	1,809	2,757	38 3 1	56 11 2	18 8 1	
No manure	1,498	2,995	19 12 4	49 10 4	29 14 0	

(II) The object of the following experiments was to compare the effects of various heavy manures for irrigated transplanted rice. The experiments were carried out in duplicate on $\frac{1}{5}$th acre plots, the variety transplanted being Badshabhog, a fine Bengal rice. The name " Khatto " is given to the dry powdered mixture of cowdung and ashes, which the cultivator applies to his lands, while " Cowdung " denotes that which is made in properly constructed covered pits on the Experimental Station, and which naturally is richer than the village manures. Dhaincha has again given the best results :—

Manure per acre.	Outturn in pounds, per acre. 1916-17. Grain.	Straw.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
			Rs. a. p.	Rs. a. p.	Rs. a. p.
Unmanured	1,368	2,808	19 6 5	62 11 4	43 4 11
Khatto 4,100 lbs.	1,424	2,690	23 6 7	64 10 9	41 4 2
Cowdung 4,100 lbs.	1,470	2,716	23 4 1	66 10 0	43 5 11
Dhaincha green manure ...	1,563	3,063	24 1 3	71 2 9	47 1 6

(III) The object of the following experiment was to find out a method for green-manuring broadcasted rice-fields with Dhaincha. Almost the whole of rice crop of this Division is broadcasted and the only successful method of green-manuring rice-fields known to this station involves the more laborious but at the same time more paying system of transplanting rice. This last forms a real obstacle in the way of introducing the green-manuring operation in this Division as the people are backward and do not like to spend the extra labour required in transplanting rice. In order, therefore, to find a suitable

method of green-manuring the broadcasted fields the following plan was devised. Dhaincha seed at the rate of 10 lbs. to the acre was mixed with the necessary quantity of seed paddy and broadcasted in the fields. The Dhaincha plants along with rice are allowed to grow for about a month, when the former is ploughed and buried into the soil at the time of weeding the broadcasted crop. The ploughing up of Dhaincha plants is made possible through the unique system of "Beushan" prevalent in this Division. By this system broadcasted fields of rice are plowed and cross-plowed in the month of July. This operation helps to thin the growing crop and stir up the soil a little. The plough was passed through the land and most of the Dhaincha plants were uprooted. These and also those few which were not uprooted were buried in the soil when the field is weeded, which operation follows the "beushaning" of the land immediately. This year's results, given in the table below, show a marked improvement over those obtained last year :—

Manure.	Outturn in lb. per acre.				Cost of cultivation per acre.	Value of yield per acre.	Profit.
	1915-16.		1916-17.				
	Grain.	Straw.	Grain.	Straw.			
					Rs. a. p.	Rs. a. p.	Rs. a. p.
Dhaincha Green-manure.	2,328	3,088	1,214	1,740	20 0 4	37 11 4	17 3 0
Unmanured ...	2,182	2,702	850	1,563	18 14 8	27 7 4	8 8 8

(IV.) *Effect of Lime on Dhaincha on green-manured fields.*—The results given in the following table are not in favour of Lime. This is due to the high price of quick lime. Although the outturn of grain from limed plots was more than those which received no lime, the net profit is still in favour of the latter plots :—

Manure.	Outturn in pounds, per acre.		Cost of cultivation per acre.	Value of yield per acre.	Profit.
	1916-17.				
	Grain.	Straw.			
			Rs. a. p.	Rs. a. p.	Rs. a. p.
Dhaincha Green manure	2,395	3,403	23 8 3	73 11 2	50 2 11
Lime, 1230 lbs. per acre on Dhaincha green-manure.	2,425	3,305	28 9 6	74 11 10	46 2 4

(*b*) *Variety Trials.*

I. The object of this experiment is to compare the yields of different quality of rices amongst themselves. The experiment was conducted in duplicate on $\frac{1}{5}$th acre plots, and lands were green-manured (the green-manure crop

failed to grow satisfactorily). The first four varieties in the following table are fine rices, while the last three are local coarse varieties :—

Variety.	Outturn in pounds, per acre.				Cost of cultivation per acre.	Value of yield per acre.	Profit.
	Average of 12 years including 1915-16.		1916-17.				
	Grain.	Straw.	Grain.	Straw.			
					Rs. a. p.	Rs. a. p.	Rs. a. p.
Dadkhani ...	1,840	3,799	1,670	4,200	21 2 1½	73 14 11	52 12 9½
Samudrabali ...	1,891	3,304	975	2,815	21 9 0	44 6 5	22 13 5
Badshabhog ...	2,059	3,653	1,260	3,023	21 9 2½	59 3 1	37 9 10½
Khasagundi ...	1,898	3,154	1,547	2,610	21 4 10	64 9 9	43 4 11
Hunda ...	2,172	3,325	1,722	2,767	21 2 4	57 0 1	35 13 9
Khura ...	2,501	3,971	2,383	2,970	21 1 8¾	72 10 1	51 8 4½
Benaphuli ...	2,270	3,574	1,985	2,870	21 4 0	61 12 9	40 8 9

II. Three varieties of Autumn (or "Aus") paddy were also tried for comparative yield. The trials were conducted both by transplanted and broadcasted methods and the following two tables give the results of these tests :—

1. Transplanted Aus paddies :—

Variety.	Outturn in pounds, per acre.		Cost of cultivation per acre.	Value of yield per acre.	Profit.
	1916-17.				
	Grain.	Straw.			
			Rs. a. p.	Rs. a. p.	Rs. a. p.
Tulsiful (coarse)	1,135	2,460	20 15 10	35 4 2	14 4 4
Benibhog (medium)	1,165	2,745	21 2 9	40 7 1	19 4 4
C. P. Aus (Fine)	1,127	3,175	21 13 7	40 10 0	18 12 5

2. Broadcasted Aus paddies:—

Variety.	Outturn in pounds, per acre.		Cost of cultivation per acre.	Value of yield per acre.	Profit.
	1916-17.				
	Grain.	Straw.			
			Rs. a. p.	Rs. a. p.	Rs. a. p.
Tulsiful (coarse)	1,555	5,245	30 9 2	53 15 9	23 6 7
Benibhog (medium)	1,535	4,345	30 11 3	55 7 1	24 11 10
C. P. Aus (Fine)	1,330	5,740	30 15 10	54 1 0	23 1 2

(*c*) *Seedling Experiments.*

I. The object of this experiment is to ascertain the most economical seedling-rate for transplanted rice. The plots were $\frac{1}{5}$th acre and the experiment was conducted in duplicate. It will be seen from the following table of results that not only there is a saving in seed, but the outturn is also increased

by transplanting a lesser number of seedlings. It must, however, be remembered that the results have been obtained on irrigated lands and therefore are only applicable to those localities where similar conditions prevail :—

Method of transplanting.	Outturn in pounds, per acre. 1916-17. Grain.	Straw.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
			Rs. a. p.	Rs. a. p.	Rs. a. p.
One seedling per hole	1,238	2,858	19 13 6	57 12 4	37 14 10
Two seedlings per hole	1,300	2,985	21 4 5	60 11 3	39 6 10
Four seedlings per hole	1,210	2,972	23 12 10	57 1 9	33 4 11
Eight seedlings per hole	1,040	2,998	32 1 0	47 14 0	15 13 0

II. In addition to the above, a further similar experiment was carried out to demonstrate the advantages of recommended method of transplanting 2 or 3 seedlings, 9 or 10 inches apart, compared with common practice of transplanting 10 or 12 seedlings, 5 or 6 inches apart, when the fields are transplanted in the beginning of the season. One of the plots treated by Farm method (2 or 3 seedlings 9 or 10 inches apart) was badly attacked by a disease, the origin of which is unknowa. The following table gives the results of these tests :—

Method of cultivation.	Outturn in pounds, per acre. 1916-17. Grain.	Straw.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
			Rs. a. p.	Rs. a. p.	Rs. a. p.
Farm method	1,409	4,166	20 7 8	57 13 2	37 5 6
Local method	1,523	3,766	23 15 5	60 4 7	36 5 2

D.—Experiments on the various modes of treating paddy seed-beds.

I. *Manurial.*—Well-made cowdung, village cowdung, and oilcakes were compared. An equal number of seedlings were transplanted and the results given in the following are averages of duplicate plots. This year's results are in favour of an application of well-made cowdung alone :—

Manures applied per acre in seed-bed.	Outturn in pounds per acre. 1916-17. Grain.	Straw.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
			Rs. a. p.	Rs. a. p.	Rs. a. p.
Cowdung on seed-bed 12,300 lbs. ...	1,810	1,947	19 5 0	54 3 8	34 14 8
Khatto ditto 12,300 lbs. ...	1,581	2,024	19 10 4	48 5 7	28 11 3
Cowdung 12,300 lbs. and oil-cake 410 lbs.	1,660	2,029	19 3 9	50 7 8	31 3 11
Khatto 12,300 lbs. and oil-cake 410 lbs....	1,704	1,998	19 4 11	51 3 3	31 14 4

II. The common seed-rate for seed-beds in this circle is 410 lbs. (5 maunds of 82 lbs.) and upwards. The object of this experiment was to find out if this rate cannot be reduced economically. The test was conducted in triplicate on $\frac{1}{5}$th acre plots, and the same number of seedlings were transplanted in every series. The table below gives average results obtained this year :—

Seeds sown per acre in seed-bed.	Outturn in pounds, per acre. 1916-17. Grain.	Straw.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
			Rs. a. p.	Rs. a. p.	Rs. a. p.
246 lbs. seeds	1,547	1,947	20 13 6	49 9 4	28 11 10
328 lbs. seeds	1,886	2,306	20 14 4	60 3 4	39 5 0
410 lbs. seeds	1,845	1,742	21 0 0	57 5 6	36 5 6

III. There are two common methods of sowing seed in seed-beds.

(1) Dry sowing, i.e., ordinary seed is broadcasted in lands as soon as these are ready ; and (2) Wet-sowing, i.e., the seed-bed is puddled, the seed is made to sprout first and then sown in the puddled field. The object of this experiment is to find out which is the better of the two methods. The table below gives average results of duplicate plots :—

Method of sowing.	Outturn in pounds, per acre. 1916-17. Grain.	Straw.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
			Rs. a. p.	Rs. a. p.	Rs. a. p.
Wet sowing	1,711	3,162	26 6 0	77 7 7	51 1 7
Dry sowing	1,701	3,049	24 11 5	76 11 8	52 0 3

IV. The seedlings are usually transplanted when about six weeks old. The following experiment was conducted to ascertain the proper age of seedlings for transplanting. The test was conducted in duplicate on $\frac{1}{10}$th acre plots and the results given here are averages of these. From the results it is apparent that the local method is certainly the best :—

Age of Seedlings.	Outturn in pounds, per acre. 1916-17. Grain.	Straw.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
			Rs. a. p.	Rs. a. p.	Rs. a. p.
20 days old...	994	2,121	22 12 4	42 13 10	20 1 6
30 do.	920	1,588	21 11 1	38 8 3	16 13 2
40 do.	1,045	2,121	22 7 7	44 11 10	22 4 3

E.—Water requirements of Broadcasted Winter Rice crop.

The object of these experiments is to find out exactly what amount of water is necessary to grow a good average crop of broadcasted winter paddy. In the irrigated tracts of this Division the cultivators are always clamouring for water and still more water and during my inspections in these areas it appeared to me that they take much water than is really necessary for the growth of the

These experiments were laid down in collaboration with the Executive Engineer, Mahanadi Division (Public Works Department). The crop was not given any artificial irrigation unless it was absolutely necessary. Notwithstanding the very irregular distribution of rainfall, during the year under report, and the deficiency in its total amount, only one artificial irrigation was found to be necessary. The average rainfall in this district is 59·13 inches, and the rainfall during the year under report was 55·45 inches. From the average results given below it will be seen that the normal rainfall, properly distributed, is more than enough for the proper growth of the crop.

Quantity of water given per acre in addition to the rainfall during the year.	Outturn in pounds, per acre. 1916-17. Grain.	Outturn in pounds, per acre. 1916-17. Straw.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
			Rs. a. p.	Rs. a. p.	Rs. a. p.
2 inches per acre	1,419	1,383	29 10 2	44 3 11	14 9 9
3 ditto	1,271	1,563	30 13 9	40 12 1	9 14 4
4 ditto	1,250	1,486	30 14 7	39 12 8	8 14 1
No artificial irrigation ...	1,069	1,409	29 14 4	34 6 10	4 8 6

F.—Cultivation Experiments.

I. The object of these experiments is to compare the outturns of broadcasted with transplanted rice. The plots were not to be irrigated unless found absolutely necessary. The experiment was carried out in duplicate on $\frac{1}{5}$th acre plots, and the results given, in the table below, are the averages :—

Method of cultivation.	Outturn in pounds, per acre. 1915-16. Grain.	1915-16. Straw.	1916-17. Grain.	1916-17. Straw.	Cost of cultivation per acre.	Value of yield. per acre.	Profit
					Rs. a. p.	Rs. a. p.	Rs. a. p.
Transplanting ...	1,927	2,362	1,491	1,588	23 2 4	44 10 2	21 7 3
Broadcasting ...	1,684	1,942	1,247	1,435	24 14 4	37 9 8	12 11 4

II. Hot weather versus Monsoon cultivation of paddy lands.

The object of this experiment is to find out what effect, if any, hot weather cultivation has on the outturn of transplanted rice, as compared to fields which are never opened up until the first rains have set in. One good effect of hot weather cultivation on the plots was that the grasses and weeds were practically killed out by exposure to the severe sun of April and May, and consequently there was less expense in weeding the paddy crop on these plots. Of course the expense of cultivating the plots ploughed during April and May was a little more but the extra yield obtained from these plots more than makes up

for extra cost incurred. The table below gives the averages of two, $\frac{1}{5}$th acre, each, plots in each case. The outturn from these plots compared with that obtained last year is less owing to the crop being attacked by a Fungoid disease :—

Method of cultivation.	Outturn in pounds, per acre. 1916-17. Grain.	Straw.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
			Rs. a. p.	Rs. a. p	Rs. a. p.
Monsoon cultivation (ploughing in June).	1,025	1,291	23 10 9	46 6 6	22 11 9
Hot weather cultivation (ploughing in April).	1,086	2,060	21 3 0	49 6 0	28 3 0

III. Effects of growing a Leguminous crop and keeping the land fallow on the succeeding Aus (Autumn) paddy crop.

The following table gives averages of results of experiments carried out on $\frac{1}{5}$th acre plots in duplicate. Field peas were used as the leguminous crop. It will be seen that the plots which had the pulse crop have given better results than those left fallow :—

Cultivation.	Outturn in pounds, per acre. 1916-17. Grain.	Straw.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
			Rs. a. p.	Rs. a. p.	Rs. a. p.
Aus paddy after pulse crop ...	1,735	3,854	24 1 0	59 6 7	35 5 7
Aus paddy after fallow ...	1,670	3,669	25 8 10	57 0 6	33 7 8

IV. The object of this experiment was to compare the outturns of broadcasted rice lands cultivated with Meston plough and country plough. The table gives the average outturn of two plots in each case :—

—	Outturn in pounds, per acre. Average of 3 years including 1915-16. Grain.	Straw.	1916-17. Grain.	Straw.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
					Rs. a. p.	Rs. a. p.	Rs. a. p.
Land cultivated with Meston plough.	1,296	1,366	1,468	1,935	17 7 11	47 5 0	29 13 1
Land cultivated with local plough.	1,278	1,230	1,409	1,550	17 11 7	41 15 7	24 4 0

G. Seed-rate.

The object of these experiments is to find out the most economical seed-rate for broadcasted winter rice. Average results of duplicate $\frac{1}{5}$th acre plots are given in the table below :—

Quantity of seeds sown per acre.	Outturn in pounds, per acre. 1916-17. Grain.	Outturn in pounds, per acre. 1916-17. Straw.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
			Rs. a. p.	Rs. a. p.	Rs. a. p.
40 seers seeds	1,578	2,203	21 6 6	51 3 9	29 13 3
30 do.	1,720	2,562	20 12 1	56 5 4	35 9 3
20 do.	1,920	2,229	19 11 0	60 15 10	41 4 10

B.—Groundnut.

I. *Variety trials.*—Five new varieties were secured and tried this year. The results given in the following tables are average of duplicate plots. The crop was very badly attacked by white ants and hence the very poor outturn :—

Variety.	Outturn in pounds, per acre. 1916-17. Grain.	Cost of cultivation per acre.	Value of yield, per acre.	Profit.
		Rs. a. p.	Rs. a. p.	Rs. a. p.
Mauritius	684	65 1 3	52 2 4	12 14 11 Loss.
Big Japan	710	66 14 5	54 1 7	12 12 10 „
Pondicherry	759	66 14 10	57 13 0	9 1 10 „
Virginia	894	68 4 6	68 2 7½	0 1 10½ „
Big Erect	369	66 15 5	28 2 0	38 13 5 „

II. *Manurial experiments.*—Lime, cowdung and canal silt were tried. The variety experimented upon was Pondicherry and the results given in the following table are averages of duplicate plots ($\frac{1}{10}$th acre each). Owing to the crop being attacked very badly by white ants the outturn obtained was very poor.

Manure applied per acre.	Outturn in pounds, per acre. 1916-17. Grain.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
1	2	3	4	5
		Rs. a. p.	Rs. a. p.	Rs. a. p.
No manure	563	67 5 1	42 15 6	24 5 7 Loss
Canal Silt 32,800 lbs. ...	727	75 5 10	55 7 6	19 14 4 „

Manure applied per acre.	Outturn in pounds, per acre. 1916-17. Grain.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
1	2	3	4	5
		Rs. a. p.	Rs. a. p.	Rs. a. p.
Lime 1,230 lbs	779	75 8 9	59 6 0	16 2 9 Loss.
Lime 1,230 lbs. and cowdung 16,400 lbs.	814	83 5 9	62 1 9	21 3 8 „
Cowdung 16,400 lbs. ...	707	78 2 5	53 14 6	24 3 11 „
No manure	677	69 10 2	51 9 0	18 1 2 „

C.—Sugarcane.

I. *Manurial experiment.*—During the year under report a series of experiments to ascertain the most economical manure for the cane crop of this locality were laid down. Only cowdung and oil-cake and mixtures of these two were used, as these are the only two manures which the local cultivators ever use. The variety experimented upon was Mungo and it was cultivated by "Ridge and Furrow" system. The results given in the following table are averages of duplicate plots ($\frac{1}{10}$th acre) :—

Manures applied per acre.	Outturn in pounds, per acre. 1916-17. Gur.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
1	2	3	4	5
		Rs. a. p.	Rs. a. p.	Rs. a. p.
Cowdung 12,300 lbs.	1,481	141 3 4	144 9 1	3 5 9
„ 12,300 lbs. and oil-cake 1,230 lbs. ...	2,926	190 5 5	285 6 3	95 0 10
„ 22,500 lbs.	2,863	176 10 0	279 4 11	102 10 11
„ 22,500 lbs. and oil-cake 1,025 lbs. ...	4,009	201 12 9	391 2 4	189 5 7
„ 28,700 lbs.	2,381	173 7 10	232 4 0	58 12 2
„ 28,700 lbs. and oil-cake 820 lbs. ...	3,508	218 6 0	342 4 3	123 14 3
„ 36,900 lbs.	3,084	193 3 8	300 13 9	107 10 1
Oil-cake 2,050 lbs.	4,113	265 0 10	401 5 3	136 4 5

II. *Ridge and Furrow* versus *Flat (shallow) planting of the crop.*—In "Flat" planting the sets are planted about 3" deep in lines. The crop is earthed up before the rains break. From the following table it will be seen that this method (flat planting) gives better results than "Ridge and Furrow" but its great drawback is that during the rains the crop

is very liable to lodge because there is not enough earth round the roots to hold it up :—

Method of cultivation.	Outturn in pounds, per acre. 1916-17. Gur.	Cost of cultivation per acre.	Value of yield, per acre.	Profit.
1	2	3	4	5
		Rs. a. p.	Rs. a. p.	Rs. a. p.
Ridge and Furrow System of planting ...	3,468	252 12 3	338 5 9	85 9 6
Flat planting	3,659	255 8 1½	356 14 10	101 6 ½

D.—Miscellaneous.

Various other crops, e.g., Gingelly, Sunhemp, Hibiscus cannabinus, Maize, Juar, Peas, etc., were tried on the Farm to ascertain their suitability to the locality. Crops grown during the *Rabi* season were a failure owing to the abnormal weather conditions and heavy rainfall.

SECTION II.

Non-Experimental Area.

1. For seed supply purposes paddy and sugarcane were grown. Table below gives the results of these crops :—

Name of crop.	Area in acres.	Cost of cultivation.	Value of yield.	Profit.
1	2	3	4	5
		Rs. a. p.	Rs. a. p.	Rs. a. p.
Paddy	30¼	650 15 0½	1,301 5 ½	650 6 4
Sugarcane	1⅛	253 5 1½	278 10 ½	25 4 11½

2. Other crops such as Dhaincha, Kulthi, Birhi, Lentils, Peas, Sunhemp, Jute, Groundnuts, etc., were also grown but owing to the very unfavourable weather conditions majority of them failed to give satisfactory results.

III.—Accounts.

1. Statements showing expenditure and receipts from Experimental and Non-experimental Area of the Cuttack Agricultural Station for 1916-17 :—

A.—*Experimental area, 48·6 acres.*

Receipts.	Rs. a. p.	Rs. a. p.	Expenditure.	Rs. a. p.
Value of farm produce ...		2,406 7 0	(1) Purchase of seeds ...	158 4 9
Credit value of farm manure ...	32 5 9		(2) Value of manures ...	207 3 3
Miscellaneous receipts ...	281 9 0		(3) Rents and rates, etc. ...	87 4 0
			(4) Labour charges ...	1,267 5 3
			(5) Maintenance charges ...	550 1 6
		313 14 9	(6) Cattle food	232 0 9
			(7) Miscellaneous expenses ...	197 1 7
Total Receipts ...		2,720 5 9	Total Expenditure ...	2,699 5 1

B.—*Non-experimental area, 48·5 acres.*

Receipts.				Expenditure.			
	Rs.	a.	p.		Rs.	a.	p.
Value of farm produce ...	1,796	15	2	(1) Purchase of seeds ...	143	14	0
Credit value of farm manure ... 32 5 6				(2) Value of manure ...	47	9	3
Miscellaneous receipts. 280 1 0				(3) Rents and rates, etc. ...	76	3	6
				(4) Labour charges ...	1,037	7	9
				(5) Maintenance charges ...	549	0	0
	312	6	6	(6) Cattle food	217	11	3
				(7) Miscellaneous expenses ...	196	11	0
Total receipts ...	2,109	5	8	Total Expenditure ...	2,304	8	9

Note.—In the above tables the value of Farm produce is based upon the market rates prevailing at the time of harvest.

2. *Statement showing actual receipts and expenditure of the Cuttack Agricultural Station for the year* 1916-17.

Assets.				*Liabilities.*			
	Rs.	a.	p.		Rs.	a.	p.
Amount remitted to Treasury.	4,077	12	6	Pay and travelling allowance of staff.	1,660	15	1
Stock in hand on 31st March 1917.	1,526	7	0	Office expenses, e.g.— Postage and telegram charges, hot weather charges, office expenses, repairs and purchase of furniture.	68	4	6
Bills due on 31st March 1917.	322	10	3				
Gross receipts ...	5,926	13	9	Non-recurring contingent expenditure, e.g.— Laying out and purchase of implements.	248	15	3
Rs. a. p.							
Stock in hand on 1st April 1916. 1,564 12 3				Recurring contingent expenditure, e.g.— Cost of cultivation, i.e., money actually spent on the upkeep of the station.	4,545	11	2
Bills due on 1st April 1916. 156 8 9							
				Total ...	6,523	14	0
Deduct—				Rs. a. p.			
Total ...	1,721	5	0	Pay and travelling allowance of staff. 1,660 15 1			
Net receipts ...	4,205	8	9	Office expenses 68 4 6			
				Non-recurring expenditure. 248 15 3			
Loss ...	340	2	5	*Deduct*—			
Total ...	4,545	11	2	Total ...	1,978	2	10
				Total ...	4,545	11	2

IV. Seed-supply.

The following statement shows the quantity of seeds supplied from the Farm :—

Name of seeds, etc.	Quantity supplied in lbs. (82 lbs. per maund).
1. Badshabhog	3,300
2. Dadkhani	3,085
3. Balam	594
4. Central Provinces Fine (Aus)	691
5. Samudrabali	246
6. Hunda	153
7. Benibhog	112
8. Khura	41
9. Khasagundi	82
10. Dhaincha	513
11. Groundnuts.—	
(Spanish Peanut)	65
(Pondicherry)	462
(Mauritius)	102
(Big erect)	38
(Virginia)	30
(Cuttack)	47
12. Jute seed	218
13. Sambalpur Juar	5
14. Sambalpur Bajra	1½
15. Sweet Juar	61
16. Arhar	52
17. Maize	21½
18. Sabour Pea	45
19. Farm Pea	60
20. Pusa Wheat	12
21. Oat	61
22. Khesari	8
23. Kulthi	2
24. Potato	20
25. Gingelly	5½
26. Hibiscus cannabinus	10
27. Biri	10
28. Rape	2
29. Turmeric	2
30. Guljee	4
31. Papaya seed	12 tolas.
32. Plantain suckers (number)	164
33. Mungo seed canes	23,600 Whole canes.
34. R. N. Banerjee's cane crushing mills	6

V. Miscellaneous.

Some 250 varieties of paddy collected from Cuttack, Puri and Sambalpur districts were grown in line cultures on the Farm. A preliminary classification and selection of these was done during the year under report.

Nine students of cultivator class were trained in practical agriculture on the farm during the year under report.

VI. Charge of the Station.

During the year under report Babu Madan Mohan Pradhan remained in charge of the Farm. He was assisted by two overseers and one clerk. The work of the station was directed and supervised by me.

VII. The Agricultural Chemist, Bihar and Orissa, very kindly analysed a large number of soil samples of the farm.

D. R. SETHI,

Deputy Director of Agriculture,

Orissa Circle.

Annual Report of the working of the Ranchi Farm for the year 1916-17.

A short account was given, in last year's report, of the starting and equipment of the Ranchi Farm and of the problems presented by the local agricultural conditions.

Additions to buildings.—The initial equipment of the farm has been increased by the building departmentally of two chaukidars' huts and a cement floor for drying grain, stacking straw, etc., and an open shed for miscellaneous purposes has recently been added.

Livestock.—There has been no change in the number of bullocks, in he year under report. A young Montgomery bull was sold to the Maharaja of Chota Nagpur for Rs. 50, and an old cow and her calf died during the year. The remaining livestock consist of a bull, four cows, two in-calf heifers, and four calves. In addition to rearing their calves, the cows gave milk to the value of Rs. 244 in the year.

Implements.— A triangular harrow was obtained from the Punjab Agricultural Department, and having been found to work satisfactorily has been copied on the Farm. They can be made at a cost of Rs. 9-8 each, and are useful for harrowing early sown crops after the preliminary monsoon showers, which otherwise make a crust and establish weeds.

A groundnut shelling machine was procured from Sholapur at a cost of Rs. 71-8. It costs as. 2-6 per maund of 82 lbs. to shell groundnuts with this machine and to separate the kernels by means of "sups". Many of the kernels are of course broken in the process, but it has been found possible to select whole kernels for seed, the remainder being disposed of to the Ranchi Jail for crushing for oil.

Owing to the war it was not possible to get the large number of American hand hoes required for weeding the upland crops and this has led to great difficulty in coping with weeds in the current season.

Laying out.—The laying out of the farm has been continued, and the area of paddy land considerably increased by a continuation of the process of making parallel horizontal *bandhs* described in last year's report. One and a half acres of inferior paddy land, on the lower side of an irregular slope, have been under-drained by drains 24 feet apart and 4 feet deep at a cost of Rs. 150 per acre.

Eight hundred yards of farm roads have been made, and the adjoining fields squared up and drained superficially.

The two tanks have been deepened, and hollows in the adjoining fields filled up.

A good deal more however remains to be done in these directions before the fields settle down to the new levels necessitated by systematic laying out.

Season.—Table I shows the rainfall from April, 1916 to March, 1917.

TABLE I.

—	April,	May.	June.	July.	August.	September.	October.	November	December.	January,	February,	March.	
1st Week	0·00	0·00	0·90	0·42	1·67	1·00	2·60	0·07	0·00	0·00	1·47	0·20	
2nd ,, ...	0·34	1·43	4·07	0·61	3·06	0·36	0·10	0·00	0·00	0·00	0·29	0·00	
3rd ,, ...	1·34	0·00	2·28	2·39	4·76	0·49	0·71	0·00	0·00	0·00	0·00	0·00	
22nd to end of month ...	0·00	0·93	1·07	0·43	1·79	7·81	3·74	0·00	0·00	0·09	0·01	0·28	
Total ...	1·68	2·36	8·32	3·85	12·28	9·46	7·15	0·07	0·00	0·09	1·77	0·48	47·51

The rain in the first half of June enabled the sowing of the upland crops to be completed before the end of that month and filled the two tanks; while the dry July gave good opportunities for weeding, and enabled the whole

of the weeding of the upland crops and the transplanting of the paddy to be completed before transplantation in the neighbourhood absorbed the local labour. The upland crops were however spoilt by the heavy and continuous rainfall during August and in the last half of September and October.

Cropping.—Table II shows the cropping of the Farm in the season 1916-17.

Groundnut was the chief crop grown, occupying about one-third of the upland. The stems were completely destroyed by *tikka* disease in September and the crop gave an average yield of only 900 lbs. per acre as compared with 2,400 lbs. in 1915.

The Japanese and Spanish varieties suffered most, the stalks for the most part rotting before it was possible to harvest the crop. Moreover the continuation of the rain during and after harvest, throughout October, made it impossible to dry the nuts in good time, and many were lost through sprouting.

Nevertheless the crop paid better than any other upland crop on the farm.

The comparatively heavier yield of the Japanese and Spanish nuts is probably due to the fact that being upright growers they are very closely planted, and cover the ground much more quickly than the spreading varieties; on the other hand they mature in 3½ months when not attacked by disease, and cannot therefore be planted so early as the spreading varieties, and are therefore usually more troublesome to weed.

TABLE II.

Name of crop.	Area in acres.	Yield per acre in lbs.	Price per 100 lbs.	Gross return per acre.	Remarks.
1	2	3	4	5	6
			Rs. a. p.	Rs. a. p.	
Groundnuts, Raipur Local ...	9·7	744	6 14 0	51 2 6	Seriously affected by *tikka* disease in September.
Do. Pondicherry ...	4·5	800	6 4 0	50 0 0	
Do. Small Japanese ...	9·47	1,093	6 5 0	69 1 0	
Do. Spanish ...	2·17	900	6 4 0	56 4 0	
Upland rice, Gora ...	10·5	600	2 13 0	16 14 0	Much damaged by rain at harvest.
Do. C. P. aus ...	1·55	555	2 15 6	16 7 9	
Lowland rice, Dacca ...	9·58	2,520	3 0 0	75 9 6	
Do. Dadkhani ...	4·8	1,870	4 1 0	75 15 6	
Do. Kalamdani ...	1·43	1,743	2 15 6	52 0 6	
Do. Bankiras ...	5·35	860	2 15 6	25 8 6	Early rices, sown broadcast
Do. Tilasar ...	0·8	620	2 15 6	18 6 6	Seriously damaged by rice bugs.
Soy beans	1·55	336	...	...	
Maize	2·00	...	...	29 2 6	Damaged by the cyclone in September 1916 and the green cobs were sold.
Rahar	1·00	312	...	...	
Dhaincha	1·5	104	...	...	
Urid	4·75	256	...	...	
Barai	2·75	...	...	...	Failed.
Guara and juar	4·4	...	...	...	Made into silage.
Sun hemp	6·0	...	...	...	Fed to cattle and some plowed under.
Sarson	4·5	763	6 5 6	48 13 0	After sanai green manure.
Lotni	4·8	103	4 4 0	4 13 3	After Gora paddy.
Wheat	1·27	800	6 4 0	50 0 0	After paddy seed-bed.
Barley	1·55	280	5 0 0	19 0 0	After C. P. aus paddy.
Oats	3·00	251	3 12 0	9 6 9	After Gora paddy.
Miscellaneous crops ...	1·4	...	...	...	
Total ...	100·67	...	...	...	

The yield of *Upland rice* (*gora dhan*) on the farm was disappointing; the cost of weeding was considerable and the value of the produce is relatively small. The crop does not seem to be worth growing with hired labour, in the ordinary way; it might be grown more cheaply by drilling the seed and weeding by means of harrows.

Urid and *barai* (*Phaseolus mungo vars.*) also gave a very poor crop, and can not compare with groundnut either in cropping power or value of the produce.

Jowar (*sorghum*) and *guara* (*cyamopsis psoraloides*)—were sown broadcast and manured with farm-yard manure. It was economically impossible to weed the crop, but it provided a large amount of *jowar* and grass for silage after the *guara* had been cut for fodder. It is clear that very great economy can be effected by drilling all upland crops in lines so as to facilitate weeding, and this practice will be adopted on the farm with a view to its introduction into the district.

Soybeans did fairly well on land that had been heavily limed, and a larger area is being grown in the current season to test its value for hay or silage. Several varieties are being tried.

Jaunpur maize and a fodder maize obtained from America promised very well, but the crop was blown down by the cyclone on September 22nd and the cobs had to be sold green. Jackals, crows, and parrots also caused much damage, and it seems probable that an isolated crop on any considerable area cannot be economically protected by hired labour.

Lowland rice was transplanted early and did very well, with the exception of 6¾ acres of early varieties which were sown broadcast in May and although they grew very well were much damaged by rice bugs when the grain was forming. The yield on this area was only 740 lbs. per acre.

The greater part of the remainder of the area was planted with a strain of 'Indursail' paddy selected by Mr. Hector, Economic Botanist to the Government of Bengal, and with *Dadkhani*, the seed of which was obtained from the Reformatory School, Hazaribāgh. The *Dadkhani* was slightly more profitable at the relatively high prices obtained locally, and, in view of the local demand for finer paddy, *Badshahbhog* is being tried in the current season. A maund of the latter was supplied to the Reverend Father Cardon, S.J., at Rengarih, and he reports that he obtained 74 maunds of paddy from this maund, and is distributing it in the neighbourhood.

The relatively high value of fine rice makes it worth exporting from out-of-the-way parts where ordinary paddy can only be grown for local consumption.

Wheat of a local variety was sown late owing to the late rainfall, on land that was kept fallow from August onwards and manured with farm-yard manure. The crop grew well, but the yield was disappointing. Of small plots of Pusa wheats, Nos. 4, 6 and 12, No. 12 gave the best outturn and will be tried on a larger scaler in the coming season.

Sarson (*brassica campestris*) gave a heavy yield on land that was manured with farm-yard manure or oilcake, but the yield after ploughing in *sanai* was very disappointing. The possible reasons for this are discussed later on in this report.

Lotni (*brassica campestris*) gave a poor crop after upland paddy in spite of abundant moisture; the land was obviously exhausted.

Barley gave a small crop after C. P. *aus* paddy and was badly infested with smut. This disease can be avoided by using clean seed, and a stock of clean seed will be grown on the farm, for distribution if required.

Experiments.

Crops.—To some extent all the above crops are experimentally grown, though on considerable areas, but the principal experiment of the year was the growth of so large an area of groundnut. In particular, the small Japanese and Spanish varieties were grown on 11½ acres in order to ascertain the cost of growing and harvesting them as compared with the larger spreading varieties.

The closer sowing of these varieties takes considerably more labour at a busy time, and, as mentioned above, they cannot be sown in May because they mature too quickly. As regards weeding the crop no difficulty was experienced in the year under report; two hoeings in July, followed by the pulling up of any large remaining weeds by hand, sufficed to keep the whole area clean. But the experience of the current season indicates that this was due to the singularly favourable distribution of the rainfall in 1916 and that in a normal year it may be exceedingly difficult to keep a large area clean unless it can be sown in May. The seed of upright plants selected from among the late-maturing, spreading varieties in 1915 was sown in single lines in 1916, and the progeny occupies a fraction of an acre on the farm in the current season. Seed of a similar type selected in Bombay has also been procured, and this late-maturing, upright type will form the greater part of the farm crop next year and will be sown as early as possible. It is hoped by this means to deal with the weeding difficulty.

As regards harvesting, the cost of pulling up the upright, Japanese and Spanish varieties and detaching the nuts comes to about Rs. 5 per acre, as compared with Rs. 45 for ploughing up and collecting singly the nuts of a big crop of the spreading variety. But in fact, owing to many of the stalks being almost completely rotted by *tikka* disease in the year under report, so many nuts remained in the ground that the crop cannot be said to have been harvested by the pulling-up process. The remaining nuts were harvested on the share system, a large proportion being given to the women who collected them. It is, however, evident that if the disease can be mitigated the upright type will have a very great advantage in the harvesting.

The whole crop was manured with lime and sulphur, and was exceedingly luxuriant when it was attacked by *tikka* early in September. The attack may have been primarily due to the continued wet of August; none of the land had ever carried groundnut before, but practically the whole of it had been cropped with *rahar* in the previous cold weather and it is possible that the fact that the groundnuts followed another leguminous crop so closely may have contributed to the susceptibility of the crop. In this connection it may be noted that in the current season disease has appeared within three weeks of sowing the crop, in a field cropped with *urid* (*Phaseolus mungo*) last year.

It is possible also that a low concentration of phosphate in the soil solution may partly account for the virulence of the disease. Groundnuts are comparatively rich in phosphate, and the soil is markedly poor, and when the swelling nuts make a heavy demand on the phosphate in the plant, and the soil is at the same time saturated with water, it is possible that the phosphate content of the plant tissues may fall below the point at which resistance to the disease is possible. Experiments to settle this point definitely are in progress during the current season.

Some plants seem to be, to some degree, resistant to the disease; selections of such were made in 1915, and one or two of the resulting lines seem to show a marked resistance. These are being multiplied as rapidly as possible.

An incidental difficulty caused by the early failure of groundnuts, and particularly of the spreading varieties which cannot be harvested early, is the rank growth of the weeds which take their place and seed freely.

The result of this is very evident in the current season; it has been impossible, with the labour and appliances available to cope with the weeds in the fields where groundnut was grown last year, and it will be necessary to adapt the rotation so as to deal with this difficulty.

It may be noted that quantitative difficulties of this kind do not arise on small experimental plots, for which sufficient labour can always be obtained, and it is only by working an experimental farm as an economic unit that such incidental but none the less serious difficulties come to light.

Other experimental crops occupied small areas.

The *Tepary beans* referred to in last year's report were sown at intervals of a fortnight from the beginning of August to September, in land that appears to have been too poor for them. Their growth was disappointing and the prolonged monsoon spoilt the produce. Two seers of seed was however increased to 33 seers, and a small quantity planted in February between rows of sugarcane on drained but unirrigated land gave a heavy crop and an excellent sample in May, at a time of year when no ordinary bean would set seed. Further experiments will be made.

A considerable number of varieties of American beans have been obtained for trial during the current season through the courtesy of Professor C. V. Piper of the U. S. A. Bureau of Plant Industry, and Mr. R. H. Forbes, Director of the Tucson Experiment Station, Arizona.

Seeds of *bambarra groundnut* (*voandzeia subterranea*) and *jack bean* (*canavalia ensiformis*) have been obtained from the Director of the "Station Agronomique" Reduit, Mauritius, and the plants are growing well.

Small samples of the following varieties of cotton have been obtained for trial in the current season and were sown early in June :—

Variety.	Type.	Obtained from.
4 F. Cotton ...	American ...	Economic Botanist, Lyallpur.
287 F. ,, ...	,, ...	,, ,,
286 F. ,, ...	,, ...	,, ,,
K. 7 ,, ...	Indian ...	,, Cawnpur.
K. 22 ,, ...	,, ...	,, ,,
K. 28 ,, ...	,, ...	,, ,,
Sindewahi Cross	,, ...	Deputy Director of Agriculture, Nagpur.
Roseum ...	,, ...	,, ,,
C. A 1, 2, 5, 10, 11, 18, 23, 28.	American ...	,, ,, Cawnpur.
Triumph Cotton.	,, ...	,, ,, Sind.
Griffin ,,	,, ...	,, ,,
Texas Big Boll	,, ...	,, ,,
Burhi Cotton	,, ...	District Agricultural Inspector, Purulia.
Kherua ,,	Indian ...	,, ,,
Local Cottons	,, ...	Rev. Fr. Cardon, S.J., Rengarih, Ranchi District.

About seven acres of the American type of cotton distributed by the Punjab Agricultural Department under the name of 4F were sown in May, in order to get an idea of the behaviour and requirements of American cotton on the Plateau, the seed was obtained from Lyallpur. It is estimated that nearly a quarter of a million acres of this cotton were sown in the Punjab in the current season.

A small area was sown with *Soudan grass* (*sorghum sp.*) in September, with seed supplied by Professor Piper. The crop grew well and produced 20 lbs. of seed which was sent to Pusa and Peshawar for trial; and the original plot is being grown on under observation.

One and-a-half acres of *dhaincha* (*sesbania aculeata*) sown for seed in 1916 gave a very poor crop except in a few patches. That this may have been due to absence of the root nodule bacteria is indicated by the fact that a small area of drained land sown during the current season and inoculated with soil from the good patches of the previous year, is producing a luxurian crop.

Manurial experiments.—No comparative manurial experiments were laid down in the year under report, the former experimental plots being cropped with *gora* paddy, and *sarson* following sun-hemp ploughed in. The most noticeable point was that these crops were best where the groundnut had given the heaviest yield in 1915, and that the *sarson* gave practically no yield on the plots that had not received bonemeal in that year, in spite of the ploughing in of a heavy crop of sun-hemp.

This experience with sun-hemp as a green manure goes to show how very uncertain this method of manuring is. It is generally agreed that the crop, if it is well grown, must be ploughed in by the end of July, in order to give time for the crop to rot completely and for the land to accumulate sufficient moisture for the cold weather crop. In this case a heavy crop of sun-hemp was ploughed in by July 28th ; nearly 29 inches of rain fell in the three months that elapsed before the *sarson* could be sown, the land was kept cultivated from September, and the sun-hemp had completely disappeared before the *sarson* was sown, yet to all appearances the sun-hemp made no difference at all to the *sarson* crop, which was almost nil on the plots that had not received bonemeal in 1915.

Half of the plots had received slaked lime in quantities varying from 30 to 210 cubic feet per acre in 1915, but there was very little difference in the crop on these plots as compared with those that had received bonemeal and no lime.

At one end of the field a piece of land that had been used as a paddy seed-bed was manured with oil-cake and cultivated with the rest of the field from the middle of August. This portion gave a very heavy yield of *sarson*, showing that the late date of sowing of the *sarson* did not account for the failure of the green-manure. Possibly the loss was due to the long interval that elapsed between the ploughing in of the green-manure and the sowing of the *sarson*—a point to which Mr. Howard has drawn attention at Pusa in connection with green-manuring for tobacco.

In the current season extensive green-manuring trials are being made of *sorguja* (*Guizotia Abyssinica*) which is generally grown in the neighbourhood as an oil-seed, being sown from the end of August onwards. If sown earlier it gives a heavy crop within two months of sowing, and its tubular stems are comparatively fibreless and it therefore rots more quickly and can be ploughed in later. Moreover the seed, at the rate of 10 lbs. per acre, costs about as. 10 as compared with Rs. 5 per acre, at least, for *sanai* : It is commonly used as a green-manure in the southern parts of the Bombay Presidency and was tried with success for laying down a lawn at Kankey last year.

Drainage Experiments.—Part of the drained swamp referred to in last year's report was manured and planted with the following varieties of sugarcane in February :—

Variety.	Obtained from—
1. Ramgarh	Reformatory School, Hazaribagh.
2. Khari	„ „ „
3. Shamsara	„ „ „
4. Dacca Gandari	„ „ „
5. Java yellow	„ „ „
6. Striped Mauritius	Dr. Barber, Coimbatore.
7. D. 74	„ „
8. J. 247	„ „
9. Red sport of striped Mauritius ...	„ „
10. Java Hebbal	„ „
11. Pansahi	„ „
12. J. 139	„ „
13. J. 33*a*	„ „
14. Cheni	„ „

The cane was watered to ensure germination, but not afterwards; it had grown exceedingly well up to the time of writing and the remainder of the drained land is being green-manured with *dhaincha* with a view to growing potatoes to be followed by sugarcane next year.

This area can be irrigated in the cold weather by the water which drains from the higher paddy-fields, and should be very valuable. There are some six acres of similar land on the farm and, this class of land seems to occur in similar proportion (about 1 to 30 of the cultivated land) all over the Plateau. If this proportion could carry sugarcane or garden crops in the cold and hot seasons it would provide employment for most of the labour required to cultivate the rest of the land during the monsoon, and would mean an entirely disproportionate gain to the agricultural economy of the Plateau.

The 1½ acres of higher paddy land that has been drained will probably not grow hot weather crops without some irrigation but should grow good crops of wheat and other cold weather grains that are normally imported into Ranchi.

If these experiments are successful it should be possible to cheapen the process of draining, with a view to its introduction into the district.

Cattle-feeding.—The supply of straw on the farm having been short, the cattle were fed very largely on rice dust or *khura* a bye-product of rice cleaning in the *dhenki* : At the rate of about one anna per 10 lbs. at which this is procurable it is a very cheap food for bullocks, particularly in the hot weather, when it saves them some of the work of chewing and the generation of much unnecessary heat in the process.

An early crop of sun-hemp was, as usual, grown for feeding at the beginning of the rains.

Two circular pits 10 feet in diameter were dug for silage. Owing to the high water level in October, it was only possible to sink them 5 and 7 feet deep, and 4 and 2 feet respectively of brick-in-mud walls were built round the top, giving a depth of about 9 feet altogether.

These pits were filled with chopped *jowar* or *gangai* (*sorghum*) and long grass, at the rate of about 2 feet every 2nd or 3rd day; time being given to allow the mass to become hot immediately below the surface before filling in more, and the sides only being much trampled. In this way the silage remains sweet, and packs more closely with less trampling than when filled so rapidly as to prevent heating, but it is necessary to protect the pit from rain, and avoid the use of wet materials.

The silage was heaped up above the top of the pit and finally covered with earth, which was added to from time to time, as the silage subsided, so as to throw off rain water.

There was almost no waste at the top and bottom of the pits, but a good deal of mouldiness at the sides. White ants did no damage. The silage was very much relished by the cattle ; even those born on the farm and which had never tasted silage before, took to it immediately.

Recommendations.—In view of the severity of the attack of *tikka* disease on the farm, and pending the results of the manurial and variety experiments now in progress, no further recommendations can be made regarding groundnut cultivation.

Advice has been given as to the making of silage, but the fact of a considerable loss at the sides of a pit makes a pit of small diameter uneconomical ; and this, combined with the necessity of consuming at least 1½ inches in depth daily, to avoid serious deterioration when once the pit is opened, makes the system impracticable for herds of less than 20 head of cattle.

Summary.—The year's working has shown the necessity for more detailed investigation, particularly as regards varieties of groundnuts, their manuring, and relation to preceding and following crops. The least difficult of the local problems seems to be that of raising the fertility of the land, the most difficult that of making good use of the increased fertility. It may be said that

the only revenue-producing crops of the Plateau at present are small oil-seeds and, until more profitable monsoon crops such as groundnuts and cotton can be extensively introduced, the export trade necessary to pay for the imports of essential artificial manures cannot be developed. Every effort is therefore being made to find crops that will enable the farm to pay its way.

The need for the equalization of the demand for labour at different seasons is another urgent problem brought to light by the year's working of the farm as a microcosm of the agricultural economy of the Plateau. The obvious remedy is the growing of cold weather crops and of sugarcane. The high lands are however too dry and percolation into the wells is too slow for extensive irrigation, and the low lands are insufficiently drained. The results already obtained appear to justify the investment of capital in the drainage of the swamp lands of the farm in attempts to cheapen the process, and a grant of Rs. 1,000 is being applied for, for this purpose.

As regards food for cattle oil-cake and rice *khura* are cheap, and there seems to be no difficulty in supplementing the supply of paddy straw with silage for large herds. The area of crops that need be specially grown for the purpose is relatively small, and the practice is being systematized on the farm with a view to ascertaining its economic limitations.

Disposal of Produce.—Besides groundnuts in the shell sold for local consumption, shelled groundnuts were sold to the Ranchi Jail at a price of Rs. 6-8-0 per maund for crushing for oil. Coarse paddy was also sold to the jail.

The receipts for the year were Rs. 2,930 and the expenditure, exclusive of the pay of the Superintendent and clerk, Rs. 7,880. This sum included Rs. 1,573 spent on laying out (chiefly levelling and draining) and on petty construction.

The farm is now in a very fertile condition and every effort will be made to increase the receipts as experience is gained.

Staff.—The credit for the excellent paddy crop belongs to Babu Bhutnath Sarkar, who superintended the farm for the most important part of the year and showed conspicuous energy and interest in his work. He has been promoted to the second grade of District Agricultural Inspectors on Rs. 80—5—110. Babu Nanda Lal Das worked with diligence as farm clerk throughout the year.

Hitherto no establishment has been fixed for the farm but in view of the uncertainty in recruiting through the Sabour College it seems to be impossible to rely on recruits to assist in the supervision of the farm work, and a stronger permanent establishment seems to be a necessity.

Visitors.—His Honour the Lieutenant-Governor of Bihar and Orissa visited the farm on 22nd September 1916, accompanied by the Hon'ble Sir E. V. Levinge, K.C.I.E., C.S.I. and Mr. Drake, I.C.S.

A. C. DOBBS,

Deputy Director of Agriculture,
Chota Nagpur Division.

Report on the Working of the Sepaya Farm in the District of Saran for the year ending 30th June 1917.

I.—Charge of the Farm.

I held charge of the Farm throughout the year. Mr. Bama Shankar, Probationary Assistant Director of Agriculture, assisted me here up to 29th August 1916, when he was transferred to officiate as Deputy Director of Agriculture, Patna Circle, Bankipore.

II.—Area of the Farm.

The area of the Farm was the same as last year, viz., Acre 234·18 made up as follows :—

		Acres.
(*a*)	Under Cultivation	142·95
(*b*)	„ Grazing	70·00
(*c*)	„ Buildings, Roads, Banswarri, etc.	21·23

III.—Breeding Herd.

1. On the 1st day of the year under report the entire Breeding Herd consisted of 231 head comprising :—

Stud Bulls			2
Breeding Cows			91
2-year old Calves, males	7		
2 do. do. females	9		
			16
1-year old Calves, males	33		
1 do. do. females	19		
			52
Calves at heel, males	32		
Do. do. females	38		
			70

At the close of the year the Herd was composed as follows :—

Stud Bulls			3 (1 young)
Breeding Cows			89
2 to 3-year Calves, males	9		
Do. do. do. females	6		
			15
1 to 2-year Calves, males	38		
Do. do. do. females	25		
			63
Under 1 year, males	48		
Do. do. females	55		
			103
Total			273

2. During the year, 72 calves were born, 32 being males and 40 females. Of these 36 were sired by Stud Bull No. 39 (Ramdin), 33 by Stud Bull No. 49 (Rajmangal) and three were born from cows which were pregnant when purhcased from outside in March 1916, their sires being unknown.

Three old cows of the Siripur Herd did not take the bull; four "threw off" and were served a second time; one produced a dead calf; seven matured late and did not produce during the year, and four, of whom three were old Siripur cows, died.

3. Four cows of which three old Siripur cows and one young calf died during the year.

4. On 28th February 1917 an auction sale of rejected animals was held on the Farm. Two bull calves after castration and 17 young female calves varying in age from seven to 35 months, were disposed of, and realized the sum of Rs. 725.

5. Six young bulls slightly over three years were sold as per the following details :—

	Rs.
1 Bull to the Central Co-operative Bank, Barh	175
1 do. do. do. do. do. Bihar	175
1 do. do. do. do. do. Banka	175
1 do. do. do. do. do. do.	125
1 do. do. do. do. do. Madhipura ...	150
1 Bull to Mr. G. Collingridge of Doudhpore Factory, Muzaffarpur	175
Total ...	975

One young bull has been reserved for Stud, and one young bull, which is rather under-sized, but of good quality, might be suitably employed on the small cattle in Chóta Nagpur. This matter is under the consideration of the Director of Agriculture, Bihar and Orissa.

6. Both our Stud Bulls are continuing to do their work satisfactorily. Bull No. 39 has sired 36 calves (18 males and 18 females). Bull No. 49 has sired 33 (13 males and 20 females) during the year, while some 50 cows are at present pregnant to both.

7. Young stock are doing well, and there should be some 21 Bulls fit for distribution during the coming year. We shall also have to dispose of some 14 female calves which we do not require on the Farm.

8. There was no case of infectious or contagious disease, and the general health of both the Breeding and Agricultural Herds was excellent. As a precautionary measure, owing to an outbreak in the vicinity, of Haemorrhagic Septicaemia 267 head were inoculated with H. S. Vaccine.

9. One hundred and fifty general cases were treated on the Farm.

10. Babu Man Mohan Banerji, Veterinary Assistant, was in charge of the Veterinary Dispensary during the year, with the exception of a period of one month 15 days which was spent on privilege leave, when Babu D. S. Shahany, the Veterinary Assistant of the Gopalganj Dispensary, acted for him in addition to his own work.

IV.—Sale of milk.

24,414 lbs. weight of milk was disposed of to Staff and outsiders, and realized the sum of Rs. 991-2-1. Table A of Appendix gives monthly details.

It is worthy of note that one of the cows "Phulia" purchased last year from Gangouli, District Shahabad, yielded, during her lactation period in the year under report, which extended to 127 days, 1,701 lbs. of milk or an average of 13·4 lbs. daily after having satisfied the needs of her calf. When at

her maximum she was giving for a few days 20 lbs. daily exclusive of what her calf was getting.

V.—Agricultural Operations.

A. (*a*) *Experimental Sugarcanes* (*Saccharum officinarum*) *planted during* 1916-17.—Sixty varieties of Sugarcanes—53 varieties received in the year 1913-14 from various quarters such as, Sabour, Pusa, Otter, and Sathi, six varieties received from Queensland in January 1915, and one variety procured locally—were successfully replanted in an area of 5·10 acres in the months of February and March 1917. The six varieties of Queensland Cane which last year occupied only ·22 acre of land have proved sufficient to plant out 2·18 acres. The entire area in addition to being green-manured with Sann Hemp (*Crotolaria juncea*) had a dressing of 15 tons per acre of mixed litter and cow-dung prior to planting. All canes are doing well.

(*b*) *Disposal of Experimental Sugarcanes planted during* 1915-16.—After using as much as was required for replanting during the current season the balance about four acres was disposed of as follows :—

	cwts.	mds.
Fed to cattle	1169·64	1591·92
Sold to different persons in Muzaffarpur ...	26·43	35·97
Sold locally	162·06	220·62
Total ...	1358·13	1848·51

The average return in weight per acre was 322·20 cwts. or 446·86 Imperial maunds.

(*c*) *Disposal of Experimental Sugarcanes planted during season* 1915-16.—These ratoons were disposed of as follows :—

	cwts.	mds.
Fed to cattle	908 12	1,236
Sold locally	34·53	47·02
Total ...	942·65	1283·02

The average outturn per acre was 184·62 cwts. or 250·58 Imperial maunds.

(*d*) *Analyses of Experimental Sugarcanes planted during* 1916-17.—In January of the current year, these canes were analysed at Sepaya under the direction of the Government Agricultural Chemist, Sabour. Table B of the Appendix gives the weight and analysis of each variety of cane.

(*e*) *Arrowing of Canes.*—The following varieties, viz., Saretha, Pawrah and D1135 flowered during the year, and specimens were sent to Dr. C. A. Barber, Government Sugarcane Expert, Coimbatore, for examination ; but with the exception of D1135, of which 7 per cent of the anthers were slightly open, the others were unfavourably reported upon.

B. (*a*) *Fodder Sugarcanes. Planting of* 1917.—14·38 acres were planted out in the month of March in " Hemja " and " Khari " for cattle food. The following was the method of planting adopted :—Furrows opened by Double Mould-board Plough followed by Subsoiler—then setts planted by hand and covered with Horse Hoe, the earth being pressed down by an iron hand roller worked in the furrow, leaving the surface of the furrow about 4 inches below the surface of the field. Later on, when the plant was about two feet high, the rows were earthed up with Horse Hoe, worked between the lines of cane, thus giving the cane a better chance of standing up. Some 7 acres have been top dressed with Sulphate of Ammonia 20-21 per cent nitrogen at the rate of 400 lbs. per acre—the fertilizer being applied at the time of earthing up.

(*b*) *Fodder Sugarcane. Planting of* 1915-16.—As stated in last year's report 12 acres of Hemja Sugarcane were planted out. These canes were harvested during the current year and proved very successful. The average outturn to the acre was 505·12 cwts. or 684·77 Imperial maunds.

(*c*) *Ratoon Fodder Sugarcane. Planting of* 1914-15.—17·69 acres of these canes were harvested during the year, and yielded an average per acre of 195·18 cwts. or 264·89 Imperial maunds. This result also may be considered satisfactory.

C. Fodder Crops other than Sugarcanes.

(*a*) *Juar* (*Andropogon sorghum*).—51 27 acres were sown and reaped during the year, yielding an average weight per acre of 204·47 cwts. or 269 Imperial maunds.

(*b*) *Cow pea* (*Vigna catiang*).—Two acres were fed to cattle green, and yielded an outturn of 130·41 cwts. or 177·50 Imperial maunds per acre.

(*c*) *Teff Grass* (*Eragsostis abassinica*).—Approximately one acre of land was put under this grass, but the return which was only 50·50 cwts. does not warrant its continuation.

(*d*) *Oats* (*Avena sativa*).—47·76 acres, after green-manuring with San^{n} Hemp and an application of 140lbs. of Superphosphate (20 per cent Phosphori^{c} acid) per acre were sown in oats. The entire crop yielded an average return of 17·01 cwts. or 23·16 Imperial maunds of grain and 22·95 cwts. or 31·23 maunds of straw. Of the above area, 28·54 acres were sown with seed grown the previous year on the Farm, and in 19·22 acres, freshly imported seed from Muzaffarnagar was sown. The crops from the two areas were threshed separately. The return from the former was 17·79 cwts. per acre of grain and 20·81 cwts. bhusa, while from the latter the yield was 15·84 cwts. grain and 26·12 cwts. bhusa.

(*e*) *Radishes* (*Raphanus satiuus*).—A plot measuring 1·50 acres was sown in the month of October 1916, and harvested in January and February 1917. After green-manuring with Sann Hemp, half the area was treated with Sulphate of Ammonia at the rate of 224lbs. per acre, the other half with Superphosphate at the rate of 140lbs. per acre before sowing. The former plot yielded at the rate of 345·78 cwts. equal to 470·66 Imperial maunds per acre, the latter, 291·45 cwts. or 397·33 Imperial maunds per acre.

(*f*) *Gram* (*Cicer arietinum*).—Two acres of land after green-manuring and an application of Superphosphate at the rate of 140lbs. per acre were sown in Kabuli Gram. The germination was poor, only 60 per cent but the yield 13·06 cwts. or 17·77 Imperial maunds per acre was distinctly good. A plot will be tried again during the coming year.

D.—Fodder Crops sown during the year to be harvested during 1917-18.

(*a*) *Juar* (*Andropogon sorghum*).—48·06 acres were sown at varying periods during the months of April to June 1917 and their results will be noted in the next year's report.

(*b*) *Hibiscus cannabinus.*—Half acre each of Mr. Howard's "improved" and the local 'deshi Patua' were sown during the month of June 1917 and the results of each will be carefully tabulated later.

(*c*) *Sann Hemp* (*Crotolaria juncea*).—49·11 acres were put under this crop for green-manuring for the next season's oats crop, during May and June 1917. The crop will be turned in during the month of August current.

(*d*) *Moth* (*Phaseolus aconitifolius*).—2·80 acres were sown in the month of June as a gree-nmanure for next oats crop.

E.—Fibre Crops.

(*a*) *Mr. Howard's improved "Hibiscus cannabinus" vernacular "Patua."*—One acre was sown in this variety, and yielded 386·40 lbs. of prepared, fibre. So as to compare the value of this fibre with that of the local Behar Hibiscus (Patua) 221 lbs. of the stalks of each (the latter having been purchased from a

raiyat's field and selected so as to be about the same length and thickness as the former) were retted together. The former yielded 10lbs., the latter 8¾lbs. of fibre. Both the samples were submitted for valuation to the Fibre Expert to the Governments of Bengal and Assam, who valued the former at £ 41 per ton and the latter at £ 38. His valuations are given in detail in Table B (i) of the Appendix. Both varieties will be grown on the farm in the coming year and comparative results will be noted.

(*b*) *Sann Hemp* (*Crotolaria juncea.*)—Two acres were sown for fibre, for use on the farm. The yield was 320lbs. fibre per acre.

F.—Manuring of various kinds.

During the year under report, the following manuring was carried out :—

(*a*) With farm-yard manure averaging 8·11 tons per acre—

	Acres.
For Sugarcane	6·00
For Juar	42·00
For Oats	7·28
For Mr. Howard's "Cannabinus"	1·00
Total ...	56·28

(*b*) With Sann Hemp turned in green in the month of August 1916 followed in September by a top dressing of Superphosphate 20/22 % water soluble Phosphoric acid at the rate of 140 lbs. per acre.

	Acres.
For Oats	44·26
For Kabuli Gram	2·00
For Teff grass	·42
For Melilotus	·50
For Radishes	·75
Total ...	47·93

(*c*) With Sann Hemp as green-manure, followed by Sulphate of Ammonia 20/21 % Nitrogen—

	Acres.
For Sugarcane at 400 lbs. per acre	7·10
For Oats at 224 lbs. per acre	1·00
For Radishes at 224 lbs. per acre	75
Total ...	8·85

VI.—Buildings operations.

The five new cow stalls referred to in last year's report as nearing completion, and the two drinking troughs in the Cow-yard were completed early in the cold weather. A new Veterinary Dispensary and a pucca drain measuring 335 feet in length leading from the Cow-yard to the main ditch near manure pits were completed during the year under report. The foundations and walls for new Bull stalls were taken in hand and completed during the month of June 1917 and it is hoped that the building will be complete and fit for occupation during September next. A new 6′ diameter well to provide good drinking water to the cow stalls was completed, all but the surrounding platform, by 30th June 1917. The platform will not be taken in hand until the surrounding earth has completely settled after the rains. Two new Sal wood frame and expanded-metal gates were provided for both entrances to the cow-stalls. A small pucca building was erected outside the cow-yard for keeping surplus milk and all milk utensils.

Petty repairs, such as pucca plastering of some walls which were previously mud plastered; whitewashing of all buildings, etc., etc., were undertaken during the year.

VII.—Laying out—including drainage.

A. (*a*) All roads on the Farm were put into good order. Several road-side ditches and one or two old manure pits were filled in with earth. A portion of the road leading to back of the cow-stalls was metalled. A great deal of jungle on the canal bank which was likely to injure our cultivated land was cut away. A rubbish pit measuring 70′×33′×3′ was excavated to the north of our manure pits. Some 40,430 cubic feet of the old ditch situated on the east side of our paddocks was filled in with earth carried from outside our Farm bund. The remaining portion of this ditch will be filled in during the coming year.

The old Veterinary Dispensary Building was entirely demolished and the site cleaned up and levelled.

(*b*) All drains were cleaned out and kept in thorough working order. Four small culverts—Raneegunge glazed pipes with masonry parapets—were erected at suitable places. Several small pucca drains covered in places with slabs of stone were made. Both the sluice gates in the Saran Embankment worked satisfactorily and there was no flooding of any of the Farm lands.

(*c*) Mr. Howard's scheme of drainage which was referred to in the last year's report, has proved of undoubted use, and the arrangement will be extended to cover all sections requiring such drainage during the coming year.

Purchase of Fencing Materials.

Sufficient "Ideal Woven" wire fencing was purchased to surround the prospective new area. Stones will probably be used as straining pillars and standards, instead of the usual steel ones, the price of which is now prohibitive, besides their not being nearly so strong and durable.

VIII.—Floods of the Gandak river.

There were two high floods of the Gandak, the 1st on the 3rd July, reading, reduced level, 17·60; the second on the 5th September, reading, 17·30; but our Farm Bund did its duty splendidly, and not a drop came on to the Farm land.

IX.—Implements and machinery.

Table C of the Appendix gives the details of all such in stock. They are all in good order.

X.—Charitable Dispensary.

I regret to say that the provision of this very necessary building has not yet taken effect. No doubt the want of funds is the reason.

XI.—Extension of the farm area.

During the year under report sanction was accorded to the acquiring of an extra area of 150 acres on the West side of the Saran Canal, in the village Sapahia. The Declaration appeared in the Gazette of 23rd May 1917.

XII.—Visitors to the farm.

The following officials visited the Farm at different periods:—

1. G. Milne, Esq., I.C.S., Director of Agriculture, Bihar and Orissa.
2. J. R. Dain, Esq., I.C.S, Offg. Director of Agriculture, Bihar and Orissa.

3. J. R. Makeig-Jones, Esq., I.C.S., Offg. Collector of Saran, Chapra.
4. G. F. Owen, Esq., I.C.S., Subdivisional Officer, Gopalganj.
5. C. Somers Taylor, Esq., Agricultural Chemist to the Government of Bihar and Orissa.
6. D. Quinlan, Esq., Superintendent, Civil Veterinary Department, Bihar and Orissa.
7. T. Southwell, Esq., Deputy Director of Fisheries, Bengal and Bihar and Orissa.
8. F. Smith, Esq., Deputy Director of Agriculture, Bengal.

XIII.—Tour of the Superintendent.

The Superintendent undertook the following tours during the year:—

24th to 27th August 1916	...	Mokameh to investigate insect pests.
11th September 1916	...	Jaisouli Sheikh near Siwan to visit Co-operative Society regarding bull.
9th to 12th November 1916	...	Sonepore to purchase bullocks.
27th February 1917	...	Hathwa regarding acquisition of additional area.
13th and 14th March 1917	...	Chapra to interview the Collector of Saran regarding the acquisition of the additional area.
10th and 23rd April 1917	...	Hathwa regarding acquisition of additional area.
20th May 1917 ...	...	Gopalganj to attend the first general meeting of the Central Co-operative Bank.

XIV.—Rainfall.

The following is a statement of Rainfall for the year ending 30th June 1917:—

July	1916	14·86	inches.
August	„	5·15	„
September	„	6·89	„
October	„	1·00	„
November	„	·00	„
December	„	·00	„
January	1917	·00	„
February	„	1·01	„
March	„	·05	„
April	„	·15	„
May	„	3·60	„
June	„	9·22	„
	Total ...	41·9	„

XV.—Receipts and Expenditure.

The following is an abstract of Receipts and Expenditure for the year ending 30th June 1917. Details are given in Table D of the Appendix:—

Gross Receipts ... ... Rs. 2,493-9-10

Expenditure.

	Rs.			
Establishment ...	...	...	16,725	2 4
Travelling Allowance	...	...	303	11 0
Grain Compensation Allowance	...	...	56	1 7
Contingent Charges	...	...	22,222	4 3
Non-recurring Charges	...	...	7,177	12 9

Rs. 46,484-15-1½

M. M. MACKENZIE,
Superintendent, Sepaya Farm.

TABLE A.

Statement showing sales of Milk during the year ending 30th June 1917.

Serial No.	Month.	Quantity.	Value.	Remark.
1	2	3	4	5
		lb. oz.	Rs. a. p.	
1	July 1916	909 0	37 3 5	
2	August „	876 2	34 3 3	
3	September „	790 8	32 3 10	
4	October „	830 8	33 13 10	
4	November „	783 0	31 5 7	
6	December „	1,218 8	49 10 3	
7	January 1917	1,517 8	61 11 7	
8	February „	1,950 8	76 10 3	
9	March „	3,453 0	136 14 3	
10	April „	4,385 0	179 0 2	
11	May „	4,381 0	180 7 4	
12	June „	3,319 8	137 14 4	
	Total ...	24,414 2	991 2 1	

M. M. MACKENZIE,

Superintendent, Sepaya Farm.

TABLE B.

Statement showing the areas, weights, and analysis of Experimental Sugarcanes planted in the month of February 1916 on the Sepaya Farm in the district of Saran.

Serial No.	Name of canes.	Area in acre of both original and check plots.	Outturn of both plots in cwt.	Outturn per acre in cwt.	Result of analysis.					Remarks.
					Brix.	Juice.	Succrose.	Glucose.	Purity.	
1	2	3	4	5	6	7	8	9	10	11
1	Rappoe	·009	2·93	325·55	16·57	73·5	13·91	0·96	83·9	These six varities of cane were received from Queensland in 1915 and they were planted in single plots.
2	Mahona	·004	1·83	457·50	14·13	67·0	11·33	1·96	80·0	
3	D. 1135	·16	66·33	414·56	14·37	61·5	11·94	1·23	83·0	
4	No. 4	·032	19·10	596·87	15·91	75·0	14·61	0·83	91·8	
5	No. 5	·008	3·30	412·50	18·04	71·3	17·40	0·98	96·4	
6	No. 6	·007	3·67	524·28	17·18	65·6	16·41	0·83	95·5	
7	Red Mauritius, I	·10	24·24	242·40	15·97	72·3	14·0	1·40	87·6	
8	Red Java	·10	28·65	286·5	6·77	66·8	14·26	1·08	85·0	
9	Red Tanna	·10	29·02	290·2	17·64	55·1	16·17	1·03	91·6	
10	Khari	·10	62·80	628·0	16·37	64·6	13·96	·99	85·2	
11	Hemja	·10	29·38	293·80	15·37	60·5	13·24	·69	86·1	
12	Mungo	·10	30·58	308·50	15·37	59·2	13·5	·65	85·5	
13	Red Tanna	·10	27·25	272·50	16·43	66·4	14·39	1·08	87·5	
14	Dhal Sundar	·10	27·92	279·20	15·69	63·5	12·9	1·96	82·2	
15	Sukli	0·76	15·06	198·15	14·77	71·6	11·72	1·79	79·3	
16	Kuswar	0·13	6·25	480·77	16·17	59·2	14·28	·65	88·3	
17	Rheora	·10	22·85	228·50	13·44	61·0	10·86	0·72	80·8	
18	Paunri	·10	27·18	271·80	13·57	47·3	11·29	0·78	83·1	
19	Chynia I	·10	12·12	121·20	15·43	60·9	11·33	1·30	73·4	
20	Kewali	·054	9·62	178·14	15·77	76·2	12·68	0·98	80·4	
21	Rheora Benares	·054	22·40	414·81	13·43	63·6	10·62	1·08	79·0	
22	Red Mauritius, II	·10	31·59	315·90	17·17	66·6	15·56	1·54	90·6	
23	Kajla	·10	25·34	253·40	15·57	69·9	13·25	1·70	84·0	
24	Khagri	·05	18·00	360·00	14·37	65·6	11·60	1·23	80·7	
25	Chynia II	·05	16·53	330·60	14·29	66·0	11·01	1·63	77·0	
26	Poraya	·10	43·50	435·00	11·88	63·1	8·98	·74	75·6	
27	Nargari	·10	41·87	418·70	13·31	69·4	9·44	1·40	70·9	
28	Shaker Chynia	·10	53·63	536·30	12·84	68·5	9·50	1·14	73·9	
29	Saretha	·10	48·49	484·90	17·69	73·0	15·23	0·49	86·0	
30	White Tanna	·10	30·85	308·50	16·11	60·8	13·90	1·23	86·2	
31	Puri	·10	18·36	183·60	15·51	73·7	12·41	1·68	80·0	
32	Panshahi	·10	20·57	205·70	14·84	67·4	13·03	1·30	88·7	
33	Lata	·10	45·55	455·50	14·69	67·2	12·88	1·28	87·6	

TABLE B—*contd.*

Serial No.	Name of canes.	Area in acre of both original and check plots.	Outturn of both plots in cwt.	Outturn per acre in cwt.	Result of analysis.					Remarks.
					Brix	Juice.	Sucerose.	Glucose.	Purity.	
1	2	3	4	5	6	7	8	9	10	11
34	Katari I	·10	33·06	330·60	15·06	61·9	12·22	0·66	81·8	
35	Buxaria	·10	37·83	378·30	12·88	66·2	10·06	0·76	78·1	
36	Barukha	·10	38·94	389·40	14·71	68·3	11·39	1·0	77·4	
37	Bombay	·072	22·11	307·08	15·37	68·7	13·26	1·44	86·2	
38	Red Bombay	·028	10·65	380·35	15·57	76·7	13·17	1·79	84·5	
39	Banarsia Nepali	·10	17·72	177·20	17·51	71·8	15·72	1·54	89·7	
40	Yuba	·10	25·71	257·10	15·49	67·8	13·22	1·36	85·3	
41	Bansa	·10	24·09	240·90	16·11	63·0	13·67	0·78	84·8	
42	Maneria	·10	27·20	272·00	16·2	66·2	13·53	1·38	83·5	
43	Striped Bansa	·10	20,20	202·00	14·69	51·5	12·53	1·28	85·2	
44	Mango	·10	39·11	391·10	15·64	56·0	13·95	0·83	89·1	
45	Red Mauritius III	·10	22·04	220·40	16·64	59·6	15·46	1·10	92·9	
46	White Tanna	·10	27·91	279·10	15·51	53·0	13·61	1·45	87·7	
47	Lewari	·10	37·65	376·50	14·64	63·5	12·97	0·80	88·5	
48	Khelia	·10	58.77	587·70	14·57	58·0	10·66	1·79	73·1	
49	Manaria	·10	38·57	385·70	16·24	68·3	13·33	1·28	82·0	
50	Khari	·10	65·20	652·00	15·89	65·4	13·79	0·55	86·5	
51	Keswar	·10	45·36	453·60	13·63	73·7	11·27	1·0	82·6	
52	Shamshara	·018	·30	16·66	...	...	...	...	...	Cane available not enough for analysis.
53	Bhuri	·041	7·53	183·66	17·31	69·2	15·69	1·08	90·6	
54	Ketari II	·10	30·49	304·90	16·64	64·1	14·42	1·02	86·6	
55	Ketari III	·10	33·61	336·10	16·17	68·0	13·44	1·44	83·1	
56	White Mauritius	·10	29·57	295·70	17·44	70·4	15·77	0·94	90·4	
57	Juba	·10	26·81	268·10	15·83	65·3	12·63	1·23	79·3	
58	Mutki Mango	·10	31·00	310·60	15·89	58·0	13·19	0·41	83·0	
59	Mungo	·054	18·35	339·81	16·69	57·0	14·32	0·54	85·8	

M. M. MACKENZIE,

Superintendent, Sepaya Farm.

TABLE B (i).

Extract from letter No. 51-F.S., dated the 11th May 1917, from the Fibre Expert to the Government of Bengal and Assam, to the Superintendent Sepaya Farm, regarding valuation of Mr. Howard's improved Hibiscus Cannabinus and local Patua.

(A)—Red Madras Hibiscus (Yerra Gogu)—Mr. Howard's pure line.

"Length six to seven feet, very good white colour, soft, fairly strong jute but harsher fibre than Bengal Jute especially at root end which has been fairly cut. As compared with Calcutta firsts at £ 42-10-0 and Bimlipatam Jute at £ 38-10-0 the value is relatively £ 41 per ton."

(B)—Behar Hibiscus (Patua).

"Length five to five and a half feet, good, light colour, but not nearly so well retted, the fibre being also not so well cut at root end and rather sandy in colour at root end, value about £ 38 per ton."

M. M. MACKENZIE,

Superintendent, Sepaya Farm.

TABLE C.

Statement showing the details of Machinery and Implements in Stock during the year ending 30th June 1917.

Serial No.	Names of Machinery and Implements.	Number.	Remarks.
1	2	3	4
1	Tangye's Combined Pumping Engine and 6″ Centrifugal Pump with fittings.	1	
2	Carters Disintegrator or Surkhi Mill	1	
3	"Albion" Reaper	1	
4	Marshall and Sons Threshing Machine 54″ drum with Elevator.	1	
5	Richmond and Chandler's Oil Cake Breaker ...	1	
6	Hand Colonial lift and Force Pump	1	
7	Rajah Ploughs	26	
8	Spring Tooth Harrow	12	
9	Two-Ton Weigh-Bridge	1	
10	Horse Hoe	2	
11	Improved Multiplex Chaffcutter, Richmond and Chandler.	1	
12	Richmond and Chandler's Corn Crusher ...	1	
13	No. 10 Automatic Feed Baling Press	1	
14	Howard's D2 Ploughs	8	
15	Ridging and Subsoiling Ploughs	2	
16	Rajah Lever Harrow, double	1	
17	Portable Engine 8 Horse Power	1	
18	T. and F. Howards' Sectional Roller 6′ × 20″ with angle and Brackets.	1	
19	Hand Rotary Lift and Force Pump and Pipes, etc., for water service.	1	
20	Meteor Rover Roadster Bicycle	1	
21	Surat Carts	5	
22	Country Carts	2	
23	One-Bullock Carts	2	
24	Sampany	1	
25	W. I. Piping Complete for water Service for Cow-stalls.	1 set.	

M. M. MACKENZIE,

Superintendent, Sepaya Farm.

TABLE D.

Statement showing total Receipts and Expenditure during the year ending 30th June 1917.

Serial No.	Receipts.	Amount.	Remarks.	Expenditure.	Amount.	Total.	Remarks.
1	2	3	4	5	6	7	8
		Rs. a. p.			Rs. a. p.	Rs. a. p.	
1	Sale of milk ...	937 3 10		Particulars.			
2	Sale of Heifers and Calves.	725 0 0		I.—Establishment.			
				1. Salary of the Superintendent.	11,100 0 0		
3	Sale of Bulls ...	325 0 0					
4	Sale-proceeds of Farm produce.	346 12 3		2. Salary of staff ...	2,986 3 1		
				3. Pay of Temporary Establishment.	2,638 15 3	16,725 2 4	
5	Miscellaneous receipts	159 9 9		II.—Travelling allowance.			
				1. Travelling allowance of Superintendent.	192 12 0		
				2. Travelling allowance of staff.	110 15 0	303 11 0	
				III—Grain compensation allowance.	56 1 7	56 1 7	
				IV—Contingent charges :—			
				1. Purchase of Cattle			
				2. Feed of Cattle ...	10,983 2 6		
				3. Purchase of Seeds	1,143 13 3		
				4. „ Manures	719 14 0		
				5. „ Implements.	1,060 9 0		
				6. Wages of Farm labourers—			
				(*a*) For cultivation	3,433 0 3		
				(*b*) For laying out	569 0 3		
				7. Petty construction and repairs.	553 3 0		
				8. Railway and Steamer freight.	221 14 3		
				9. Cooly and cart hire.	170 1 0		
				10. Service postage and telegram charges.	121 10 6		
				11. Rent, rates and taxes.	768 12 6		
				12. Cold and hot weather charges.	126 0 6		
				13. Purchase and repair of furniture.	139 2 6		
				14. Office expenses ...	135 2 6		
				15. Miscellaneous contingencies.	2,076 14 3	22,222 4 3	
				Carried over ...	...	39,307 3 2	

TABLE D—*contd.*

Serial No.	Receipts.	Amount.	Remarks.	Expenditure.	Amount.	Total.	Remarks.
1	2	3	4	5	6	7	8
					Rs. a. p.	Rs. a. p.	
				Brought forward ...	...	39,307 3 2	
				Particulars—*contd.*			
				V—Non-recurring charges.			
				1. Construction of Cow stalls with trough and drain.	1,546 0 9		
				2. Veterinary Dispensary building.	600 0 0	...	
				3. Cost of fencing additional area.	4,520 11 0	...	
				4. Construction of well.	256 6 9	...	
				5. Construction of Bull Stalls.	254 10 3	7,177 12 9	
	Grand total ...	2,493 9 10		Grand total ...	...	46,484 15 11	

M. M. MACKENZIE,

Superintendent, Sepaya Farm.

Annual Report of the Well-Boring Section for the year ending 30th June 1917.

The well-boring establishment at the beginning of the year consisted of one Superintendent, one clerk, six Muharrirs, one man officiating as Muharrir and six mates to assist Muharrirs One apprentice has been sent for training by the District Board, Shahabad. He has now finished his training and is qualified to undertake the duties of a well-boring muharrir himself.

The commencement of work in Orissa Division under the Deputy Director of Agriculture, necessitated the presence of the Well-Boring Superintendent in Orissa continuously for two months at the busiest time of the year, in order both to organize the work, and start the training of local men for the post of boring muharrir. To start the work one muharrir and one trained mate were placed at the disposal of the Deputy Director of Agriculture, Orissa and three complete sets of boring tools were also sent to him from our stock. There was a distinct difficulty in getting muharrirs to go to Orissa from Behar, and I had to take drastic disciplinary measures in the case of one man, suspending him for seven months, as he did not proceed to Balasore after orders and due warning of the consequence of disobedience.

The present arrangement under which there is only one Superintendent for Orissa and Bihar, is unsatisfactory, as sufficient inspection is not possible. This lack of proper inspection has caused difficulties in several cases which have been separately reported to the Director of Agriculture, Bihar and Orissa. It is now under consideration whether the amount of work now on hand will justify the appointment of another superintendent. Under the present system a certain amount of experimental boring is done but the majority of borings are done at the request of private owners who desire to improve the water-supply in their wells The cost of boring must, therefore, be limited to very small amounts and in consequence up to the present only open tube wells of narrow diameter without strainers have been sunk. The present high price of the casing pipe necessary for lining the tube, however, has sent up the expense to such an extent, that small owners think twice before applying for well-boring.

Unfortunately these conditions are likely to affect the work of the coming year also. In consequence it has been almost impossible to make out a programme, as it is very difficult to get in applications sufficiently early for the purpose.

During the year 38 borings were completed. This was an increase of 4 over the previous year's work, but is still unsatisfactory. The main reasons have been given above, the chief one being the difficulty as regards the cost of casing pipe, to which is added the difficulty of inspection during what should have been two of the busiest months of the year. Of these 38 wells 19 were for private owners, 10 for Local Boards, 5 for the Sanitary Engineer, Bihar and Orissa, 3 experimental borings at our own cost and one tube well at Sepaya.

We have, up to the present, never been able properly to test this tube well, owing to the difficulty experienced now in obtaining suitable pumps.

Of the exploratory borings undertaken for the Sanitary Engineer, by far the most interesting was a series of four bored near Balasore town. These borings were found to give artesian springs, and I understand that the Sanitary Engineer is of opinion that an ample supply of water for a waterworks could be obtained from the sand bed which was tapped.

The majority of the boring for private or semi-private persons was done in the Monghyr district, in which 3 trial borings were made at our instance and 17 wells were bored, 10 of which belong to Local Boards and 7 to private persons. Hard rock was encountered in two of the Local Board wells. The wells bored for private persons have in every case been successful, but in one case the owner was unable to meet the cost of the casing pipe, and it had to be removed.

In Saran District 10 wells were bored for cultivators and one tube well was completed at Sepaya. Of these 10 borings made for private persons 6 appear to have been definitely successful. Two are said to have improved the water-supply, and 2 were unsuccessful owing to the presence of very fine sand in great depth. It is unfortunate that we have not been able properly to test the strainer tube well at Sepaya, but these failures would probably have been successes had some form of strainer tube been employed. The cost of strainers is, however, far beyond the reach of the ordinary raiyat. Some form of light power plant would also be required for the satisfactory sinking of large tubes necessary for strainers, as the present apparatus is not suitable. The expense of such a plant would, under present conditions, be prohibitive.

In the Bhagalpur district two wells were bored, and three experimental borings were undertaken at the request of the District Engineer. The private borings are of little interest. One was successful and the presence of fine sand caused the other to be a failure. The experimental borings, however, are of interest in that they indicate that the coarse sand met with at a depth from 150 feet to 250 feet from ground level at Sabour appears to exist in a band round the south of Bhagalpur. This result was communicated to the Board and also to the Sanitary Engineer, as it may be of use in preparing schemes for the future water-supply of parts of Bhagalpur.

In the Patna District exploratory borings are being done, in connection with the Bihar Waterworks Scheme, at the request of the Sanitary Engineer to whom I communicate the results as they are received. The work should soon be finished.

C. S. TAYLOR,

Agricultural Chemist.

No. 1.

Statement showing number and location of wells bored during the year 1916-17.

Serial No.	Location.				Name of owner.	Diameter of well.	Depth of well below G. L.	Depth of boring below G. L.	Surface of water below G. L.	Length of casing pipe.	Remarks.
	District.	Subdivision.	Thana.	Village.							
1	2	3	4	5	6	7	8	9	10	11	12
						Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	
1	Bhagalpur ...	Sadr ...	Colgong ...	Sanokher ...	Manager, T.&S. Lall	8 3	42 0	116 0	31 0	107 0	Successful.
2	Ditto ...	Do. ...	Nathnagar ...	Bhangapul ...	.....	...	...	103 0	...	42 0	Exploratory boring.
3	Monghyr ...	Do. ...	Kharagpur ...	Gangta ...	.....	...	...	38 0	5 0	26 0	Ditto.
4	Bhagalpur ...	Do. ...	Kotwali ...	Jicho ...	.....	...	...	101 0	13 0	99 0	Ditto.
5	Monghyr ...	Do. ...	Kharagpur ...	Milki Banahra	Parsan Singh ...	5 0	26 0	62 6	14 0	9 3	Successful.
6	Ditto ...	Do. ...	Ditto ...	Mohm a c h a k Banahra.	Jainarain Singh ...	4 0	20 0	55 0	9 0	16 6	Successful. Pipe pulled out as the owner could not afford to pay the cost of pipe.
7	Ditto ...	Do. ...	Surajgarha ...	Haldia ...	Local Board ...	6 2	31 6	87 6	23 6	37 9	Slightly improved.
8	Saran ...	Siwan ...	Darauli ...	Sikia ...	Inarmal Rai ...	6 9	27 0	54 0	15 9	18 0	Successful.
9	Do. ...	Do. ...	Siwan ...	Balli ...	Debi Rai and Sheosaran Rai.	7 0	16 0	50 0	9 0	28 0	Improved.
10	Do. ...	Do. ...	Do. ...	Do. ...	Deonat Ahir ...	5 0	25 0	57 0	14 0	18 0	Successful.
11	o. ...	Do. ...	Darauli ...	Sikia ...	Samarath Rai ...	7 6	27 0	48 0	7 0	...	Unsuccessful.
12	Monghyr ...	Sadr ...	Kharagpur ...	Matia ...	.....	...	...	39 0	18 0	18 6	Exploratory boring.
13	Saran ...	Siwan ...	Mahrajganj ...	Ujain ...	Shewdeni Rai ...	6 6	28 0	48 0	7 0	14 9	Successful.
14	Do. ...	Do. ...	Ditto ...	Gobindpur ...	Nawab Singh ...	7 9	29 0	52 0	14 6	16 6	Improved.
15	Monghyr ...	Sadr ...	Surajgarha ...	Gopalpur ...	Local Board ...	4 0	36 0	80 0	15 0	28 9	Successful.
16	Ditto ...	Jamui ...	Sikandra ...	Amin ...	Ditto ...	7 0	30 0	79 0	26 0	18 9	Ditto.
17	Ditto ...	Do. ...	Ditto ...	Mircha ...	M. Abdul Aziz Khan	6 0	28 0	61 0	18 0	6 9	Ditto.
18	Bhagalpur ...	Sadr ...	Kotwali ...	Lodipur ...	.....	...	...	160 0	18 0	151 0	Exploratory boring.
19	Saran ...	Siwan ...	Mahrajgunj ...	Bela ...	Surujman Ahir ...	9 4	22 0	44 0	5 0	10 0	Successful.
20	Monghyr ...	Sadr ...	Surajgarha ...	Bhawanipur...	Local Board ...	6 0	32 0	76 0	23 0	29 0	Ditto.
21	Ditto ...	Jamui ...	Jamui ...	Guddi ...	.....	...	...	22 6	...	8 0	Unsuccessful on account of rock.
22	Ditto ...	Do. ...	Ditto ...	Chordiha ...	Local Board ...	4 8	31 0	59 6	22 0	18 3	Successful.
23	Saran ...	Gopalgunj ...	Gopalgunj ...	Sepaya ...	Supdt., Sepaya Farm	3 0	16 0	32 0	...	18 0	Tube well.
24	Bhagalpur ...	Sadr ...	Colgong ...	Malikpur tola Bazia.	Bikram Mandal ...	6 0	26 0	71 0	...	...	Unsuccessful on account of great depth of fine sand.
25	Monghyr ...	Do. ...	Surajgarha ...	Pokhrawan ...	Local Board ...	0	31 0	60 0	21 0	18 6	Successful.
26	Saran ...	Siwan ...	Siwan ...	Fatehpur alias Karmasi.	Sheikh Anwar Ali ...	12 0	32 0	65 0	12 0	20 0	Unsuccessful on account of great depth of fine sand.
27	Monghyr ...	Sadr ...	Surajgarha ...	Pokhrawan ...	B. Ram Karan Singh...	8 6	25 0	55 0	15 0	26 6	Successful
28	Ditto ...	Do. ...	Ditto ...	Ditto ...	B. Hanuman Singh ...	6 0	33 0	71 0	18 0	25 0	Ditto.
29	Ditto ...	Jamui ...	Jamui ...	Nerbada ...	Local Board ...	7 0	31 0	36 6	...	...	Unsuccessful on account of rock.
30	Ditto ...	Do. ...	Do. ...	Do. ...	Bhuvnarain Lal ...	4 0	25 0	5 0	17 0	15 11	Successful.
31	Saran ...	Siwan ...	Sisaon ...	Khajehpur ...	Ganesh Lal ...	6 0	30 0	55 0	12 0	10 0	Ditto.
32	Monghyr ...	Jamui ...	Jamui ...	Bariarpore ...	Local Board ...	7 0	23 0	60 6	10 0	17 1	Ditto.
33	Saran ...	Siwan ...	Mahrajgunj ...	Gobindpur ...	Nawab Singh ...	8 0	23 0	51 0	10 0	23 6	Ditto.
34	Monghyr ...	Jamui ...	Sikandra ...	Mircha ...	M. Abdul Aziz Khan...	11 0	33 0	70 6	18 0	18 6	Greatly improved.
35	Ditto ...	Do. ...	Ditto ...	Tuladih ...	Local Board ...	4 0	22 0	57 0	17 3	25 0	Improved.
36	Patna ...	Bihar ...	Bihar ...	Bihar ...	Cost borne by Sanitary Engineer.	...	...	148 0	...	146 0	Exploratory boring.
37	Monghyr ...	Jamui ...	Nawadih ...	Nawadih ...	Local Board ...	4 0	30 0	65 0	28 0	35 0	Unsuccessful on accou of rock.
38	Balasore ...	Sadr ...	Sadr ...	Nawapur ...	Cost borne by Sanitary Engineer.	...	...	132 0	...	132 0	Successful.

No. 2.

Abstract statement of wells bored during the year 1916-17.

District.	Subdivision.	Depth of well.			Depth of boring.			Depth to the bottom of boring.			Greatest depth bored.	Least depth bored.	Greatest depth to the bottom of boring.	Least depth to the bottom of boring.	Remarks.
		No. of well.	Total depth.	Average depth.	No. of well.	Total depth bored.	Average depth bored.	No. of well.	Total depth.	Average depth.					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
			Ft. In.	Ft. In.		Ft. In.	Ft. In.		Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	
Bhagalpur ...	Sadr ...	2	68 0	34 0	5	516 0	103 2	5	584 0	116 9	160 0	45 0	160 0	71 0	3 Exploratory borings.
Monghyr ...	Do. ...	8	234 6	29 3	10	389 6	38 11	10	624 0	62 4	56 0	29 0	87 6	38 0	2 ditto.
Ditto ...	Jamui ...	9	253 0	28 1	10	318 6	31 10	10	571 6	57 1	49 0	5 6	79 0	22 6	1 ditto.
Saran ...	Siwan ...	10	259 0	25 11	10	265 0	26 6	10	524 0	52 5	34 0	20 0	65 0	44 0	
Do. ...	Gopalganj ..	1	16 0	16 0	1	16 0	16 0	1	32 0	32 0	16 0	16 0	32 0	32 0	Tube well with Brownlie strainers.
Patna ...	Bihar ...	...	...	...	1	148 0	148 0	1	148 0	148 0	148 0	148 0	148 0	148 0	1 Exploratory boring.
Balasore ...	Balasore ...	...	...	...	1	132 0	132 0	1	132 0	132 0	132 0	132 0	132 0	132 0	Ditto.

Brief Report of Well-Boring Section.

(ORISSA CIRCLE.)

For the year ending 30th June 1917.

As per orders of the Director of Agriculture, Bihar and Orissa, a section of the Well-Boring Department was transferred to this Division under my control in the beginning of April 1917.

Three sets of tools have been given to me but owing to the lack of trained staff only one set was working during the first month (April), and two sets in the months of May and June. Men are being trained for the posts of Muharrirs and Mates and as soon as they are fit to be put in charge of the third set of tools it will be done.

The boring work is done at present by two trained Muharrirs sent from Bihar. It is supervised occasionally by the Well-Boring Superintendent and constantly by myself.

In obedience to the orders of the Director of Agriculture, Bihar and Orissa, the work has been started in Balasore District. A scheme of work for conducting demonstrational borings in Balasore District has been prepared by me in consultation with the Well-Boring Superintendent.

From the beginning of April 1917 to the end of June six complete borings were done in Balasore. I herewith append a statement showing the depths to which these borings were done :—

Statement showing number and location of wells bored during the year 1916-17.

Serial No.	Location.				Name of owner.	Diameter of well.	Depth of trial pit below G. L.	Depth of boring below G. L.	Surface of water below G. L.	Length of casing pipe.	Remarks.
	District.	Subdivision.	Thana.	Village.							
1	2	3	4	5	6	7	8	9	10	11	12
1	Balasore	Balasore	Balasore	Nayapur	Balasore Municipality exploratory boring at E.	...	8′ deep	95′ 0″	2′ 0″	...	Successful. Pipe pulled out.
2	Do.	Do.	Do.	Do.	Do. do. at F	...	9′ ,,	74′ 0″	2′ 0″	...	Do. do.
3	Do.	Do.	Do.	Do.	Do. do. at G with 4″ pipe	...	12′ ,,	62′ 0″	5′ 0″	...	
4	Do.	Do.	Do.	Do.	Do. do. at G with 2½″ pipe.	...	12′ ,,	40′ 0″	...	...	Work stopped at the request of Sanitary Engineer, Bihar and Orissa.
5	Do.	Do.	Do.	Chandipur	Trial Boring No. I	...	8′ ,,	46′ 6″	13′ 0″	...	Trial boring. Successful. Pipe pulled out.
6	Do.	Do.	Do.	Do.	Do. do. No. II	...	5′ ,,	78′ 0″	14′ 0″	...	Ditto.
7	Do.	Do.	Do.	Do.	Do. do. No. III	...	6′ ,,	56′ 0″	15′ 0″	...	Ditto.

The work so far is progressing satisfactorily, but as the work advances it will be found necessary to appoint a trained Superintendent or Assistant Superintendent to be constantly at the spot and supervise the work properly in order that it may get on satisfactorily.

D. R. SETHI,

Deputy Director of Agriculture, Orissa Circle.

B. & O. G. P. (Agri.) No. 56—372—5-2-1918—H. P. G.

REPORT

ON THE

AGRICULTURAL ACTIVITIES OF GOVERNMENT

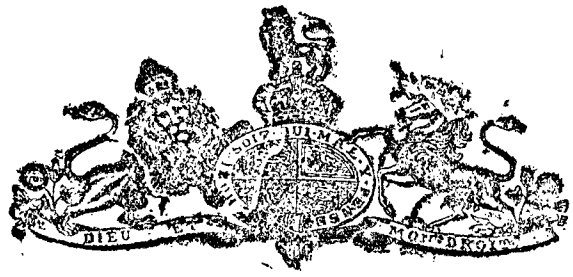
IN

BIHAR AND ORISSA

FOR

THE YEAR 1917-18

Ending the 30th June 1918.



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